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Literature Analysis on the Implementation of Digital Media *Maharah Qira'ah* Based on *Text To Speech* / Analisis Literatur tentang Implementasi Media Digital *Maharah Qira'ah* Berbasis *Text To Speech*

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Abstract: This article aims to analyze the literature related to the implementation of Text-to-Speech (TTS) technology in the teaching of *maharah qira'ah* (reading skills) in Arabic language education. The method used is a literature review by analyzing selected scholarly sources published between 2019 and 2024. The findings indicate that TTS technology contributes positively to enhancing students' phonetic comprehension, pronunciation, and learning motivation. It also promotes self-directed and inclusive learning, especially for students with special needs. Nevertheless, several challenges remain, such as suboptimal TTS voice quality for Arabic, semantic context mismatches, and limited integration into the curriculum. Analysis using the VOS viewer application shows that this topic holds further development potential in the academic realm. Therefore, further research is needed to develop TTS systems that are more adaptive to the complexity of the Arabic language, along with implementation strategies aligned with pedagogical needs. This article offers insight into the urgency of integrating technology into Arabic language learning and highlights the potential of TTS as an innovative tool to improve students' reading competence.

Abstrak: Artikel ini bertujuan untuk menganalisis literatur terkait implementasi teknologi TTS dalam pembelajaran *maharah qira'ah*. Metode yang digunakan adalah *literature review* dengan menganalisis sumber-sumber ilmiah terpilih dari tahun 2019 hingga 2024. Hasil kajian menunjukkan bahwa TTS memberikan kontribusi positif dalam meningkatkan pemahaman fonetik, pelafalan, dan motivasi belajar siswa. Teknologi ini juga mendorong pembelajaran mandiri dan inklusif, terutama bagi peserta didik dengan kebutuhan khusus. Meskipun demikian, beberapa kendala masih ditemukan, seperti kualitas suara TTS yang belum optimal untuk bahasa Arab, ketidaksesuaian konteks semantik, dan keterbatasan integrasi dalam kurikulum. Analisis melalui aplikasi VOSviewer menunjukkan bahwa topik ini memiliki potensi pengembangan lebih lanjut dalam dunia akademik. Dengan demikian, dibutuhkan penelitian lanjutan untuk mengembangkan TTS yang lebih adaptif terhadap kompleksitas bahasa Arab serta strategi implementasi yang selaras dengan kebutuhan pedagogis. Artikel ini memberikan wawasan tentang urgensi integrasi teknologi dalam pembelajaran bahasa Arab dan potensi TTS sebagai alat bantu yang inovatif dalam meningkatkan kompetensi membaca peserta didik.



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Introduction

Arabic has a high urgency in various aspects of life, especially in the fields of education, religion and global communication.¹ As the main language in the Koran and Hadith, a good understanding of Arabic is the key for Muslims in exploring Islamic knowledge in depth.² In addition, Arabic also plays an important role in the academic and professional world, especially in the fields of Islamic studies, literature, and international diplomacy. Therefore, Arabic language learning needs to be optimized with effective and innovative methods so that students can master language skills well.³

The aim of learning Arabic is to equip students with language skills that include understanding, communication and expression in Arabic both orally and in writing.⁴ Successful Arabic language learning is when students can master four language skills both orally and in writing.⁵ In the context of learning, there are four main skills that must be mastered, namely *maharah istima'* (listening ability), *maharah kalam* (speaking ability), *maharah qira'ah* (reading ability), and *maharah kitabah* (writing ability).⁶ Reading skills (*maharah qira'ah*) are a crucial aspect in understanding Arabic texts well, especially in the context of academic and religious literature.

Maharah Qira'ah is a reading skill that is a process that is carried out and used by readers to obtain the message that the writer wants to convey through the medium of words/written language. Reading skills can also be defined as material presented in reading form, with the aim that students have the ability to read sentences in Arabic fluently and accurately.⁷ a process that requires that a group of words that constitute a

¹Mohammad Zaki, 'Urgensi Bahan Ajar Bahasa Arab Sebagai Penentu Dalam Proses Belajar Mengajar', *AL-AF'IDAH: Jurnal Pendidikan Bahasa Arab Dan Pengajarannya*, 5.1 (2022), pp. 92–104, doi:10.52266/al-afidah.v5i1.876.

² Maldonado Rodríguez, Velastequí, 'Urgensi Bahasa Arab Dalam Pendidikan Islam Di Era Revolusi Industri 4.0', 2.2 (2019), pp. 1–23.

³ Maryam Nur Annisa and Randi Safii, 'Analisis Kebutuhan Belajar Bahasa Arab Sebagai Bahasa Asing Dalam Konteks Pendidikan Tinggi', *ELOQUENCE: Journal of Foreign Language*, 2.2 (2023), pp. 313–28, doi:10.58194/elouquence.v2i2.861.

⁴ R. Umi Baroroh and Fauziyah Nur Rahmawati, 'Metode-Metode Dalam Pembelajaran Keterampilan Bahasa Arab Reseptif', *Urwatul Wutsqo: Jurnal Studi Kependidikan Dan Keislaman*, 9.2 (2020), pp. 179–96, doi:10.54437/urwatulwutsqo.v9i2.181.

⁵ Umi Hijriyah and others, 'Pengembangan Media Pembelajaran Bahasa Arab Berbasis Android Untuk Mahūrat Al Istimā' Kelas 8 Smp', *Al Mi'yar: Jurnal Ilmiah Pembelajaran Bahasa Arab Dan Kebahasaaraban*, 5.2 (2022), p. 239, doi:10.35931/am.v5i2.1352.

⁶ Siti Salwa Mohd Noor and others, 'Kemahiran Bertutur Bahasa Arab Luar Kelas Dalam Kalangan Penutur Bukan Asli Bahasa Arab', *BITARA International Journal of Civilizational Studies and Human Sciences*, 4.2 (2021), pp. 59–69 <<https://www.bitarajournal.com/index.php/bitarajournal/article/view/192>>.

⁷ Ahmad Ibnu Ridwan, Akhmad Alim, and Abdul Hayyie Alkattini, 'Pengembangan Maharotul Qira'ah Dalam Pembelajaran Bahasa Arab Di Madrasah Aliyah Negeri 4 Bogor', *Tawazun: Jurnal Pendidikan Islam*, 17.1 (2024), pp. 202–26, doi:10.32832/tawazun.v17i1.15954.

whole be seen at a glance, and that the meaning of individual words be known.⁸ *Maharah qira'ah* in Arabic still faces various problems that affect the effectiveness of students' reading competence achievement. One of the main obstacles is the lack of understanding of the correct phonetic and grammatical rules, so that students have difficulty reading Arabic texts fluently and understanding their meaning deeply.⁹ In addition, the limited interactive learning resources and the lack of learning media that support proper pronunciation also become inhibiting factors in mastering *maharah qira'ah*. Conventional learning methods are also often less effective in attracting students' interest in learning, especially in the aspect of reading practice that requires direct guidance from teachers.

Technological developments have presented various types of media that can be utilized in various aspects of life, including in the world of education, especially in learning Arabic.¹⁰ Global demands require the world of education to be able to follow technological developments in improving the quality of education in the learning process. According to Effendi, 2019 the application and adaptation of technology in learning activities is a must in facing the challenges of change in the era of globalization, because the development of information and communication technology has influenced the learning process.¹¹

The development of technology, in the implementation of digital media based on text-to-speech (TTS) in learning *maharah qira'ah* provides an innovative solution to improve students' reading skills. This technology helps students listen to the correct pronunciation, improve text comprehension, and strengthen phonetic and intonation aspects in Arabic.¹² Therefore, literature analysis on the implementation of TTS-based digital media in *qaharah qira'ah* learning is important to explore the effectiveness and challenges in its use.

⁸ Putri Putri, 'Mafhum Maharah Qiraah Dan Maharah Kitabah', *Islamic Education*, 2.2 (2022), pp. 1–5, doi:10.57251/ie.v2i2.376.

⁹ Mualim Wijaya and Faiqotul Hikmah, 'Problematika Pembelajaran Maharah Qiro'ah Dalam Pembelajaran Bahasa Arab Pada Siswa Madrasah Ibtidaiyah', *Jurnal Educatio FKIP UNMA*, 9.2 (2023), pp. 858–64, doi:10.31949/educatio.v9i2.4880. Lady Farah Aziza and Ariadi Muliansyah, 'Keterampilan Berbahasa Arab Dengan Pendekatan Komprehensif', *El-Tsaqafah: Jurnal Jurusan PBA*, 19.1 (2020), pp. 56–71, doi:10.20414/tsaqafah.v19i1.2344.

¹⁰ Euis Sholihah, Adi Supardi, and Irpan Hilmi, 'Teknologi Media Pembelajaran Bahasa Arab', *Jurnal Keislaman Dan Pendidikan*, 1.2 (2019), pp. 12–15.

¹¹ Belva Saskia Permana, Lutvia Ainun Hazizah, and Yusuf Tri Herlambang, 'Teknologi Pendidikan: Efektivitas Penggunaan Media Pembelajaran Berbasis Teknologi Di Era Digitalisasi', *Khatulistiwa: Jurnal Pendidikan Dan Sosial Humaniora*, 4.1 (2024), pp. 19–28, doi:10.55606/khatulistiwa.v4i1.2702.

¹² Afiffah Vinda Prananingrum, Ikhwan Nur Rois, and Anna Sholikhah, 'Kajian Teoritis Media Pembelajaran Bahasa Arab', *Konferensi Nasional Bahasa Arab (KONASBARA)*, 3.1 (2020), pp. 303–19 <<https://journal.staimsyk.ac.id/index.php/ihtimam/article/viewFile/220/162>>.

Arabic language learning continues to develop along with the advancement of digital technology. One innovation that is starting to be widely applied is the use of text-to-speech (TTS) technology to improve reading skills (*maharah qira'ah*). Text-to-speech (TTS) is a system that can convert text in a language format into speech according to the reading of the text in the language used.¹³ This technology allows computer systems to convert written text into sound, thereby helping students practice understanding and pronouncing Arabic texts.¹⁴ However, the implementation of this technology still faces various challenges and requires further study to identify its effectiveness in Arabic language learning.

In the world of education, the use of digital technology is increasingly emphasized to increase the efficiency and effectiveness of learning.¹⁵ Technology provides opportunities for students to learn independently without always relying on the presence of a teacher.¹⁶ With technology, students can listen to the correct pronunciation of Arabic texts and improve their ability to understand readings more deeply.¹⁷ However, the success of implementing this technology is highly dependent on several factors, such as the quality of the sound produced, clarity of articulation, and integration into existing learning systems. In addition, in several studies by Suharia Sarif Amran AR 2024 it was found that the use of TTS in Arabic language learning can help students with reading difficulties or visual impairments to more easily access learning materials.¹⁸ This shows that TTS has great potential to increase inclusivity in education.¹⁹ However, the main challenge faced is how to optimize this technology to suit the needs of Arabic language learning which has certain complexities, such as harakat, tajwid, and dialect differences.²⁰ Therefore, further research is needed to explore the extent to which tts is

¹³ Lia Suci Fitriawati and others, 'Implementasi Text To Speech Pada Website Menggunakan Metode Shallow Parsing', *InfoTekJar : Jurnal Nasional Informatika Dan Teknologi Jaringan*, 5.1 (2020), pp. 61–69.

¹⁴ Muhammad Zamroni and others, 'Interactive Media Development of Articulate Storyline Application for Mts Level Arabic Learning', *Jurnal Pendidikan Glasser*, 7.1 (2023), p. 42, doi:10.32529/glasser.v7i1.2228.

¹⁵ Teti Depita, 'Pemanfaatan Teknologi Dalam Pembelajaran Aktif (Active Learning) Untuk Meningkatkan Interaksi Dan Keterlibatan Siswa', *TARQIYATUNA: Jurnal Pendidikan Agama Islam Dan Madrasah Ibtidaiyah*, 3.1 (2024), pp. 55–64, doi:10.36769/tarqiyatuna.v3i1.516.

¹⁶ Haris Budiman, 'Peran Teknologi Informasi Dan Komunikasi Dalam Pendidikan', *Al-Tadzkiyyah: Jurnal Pendidikan Islam*, 8.1 (2017), p. 31, doi:10.24042/atjpi.v8i1.2095.

¹⁷ Fazri Nur and others, 'Perkembangan Teknologi Media Pembelajaran Bahasa Arab', *Jurnal Pendidikan Bahasa Arab*, 4.2 (2023), pp. 158–78.

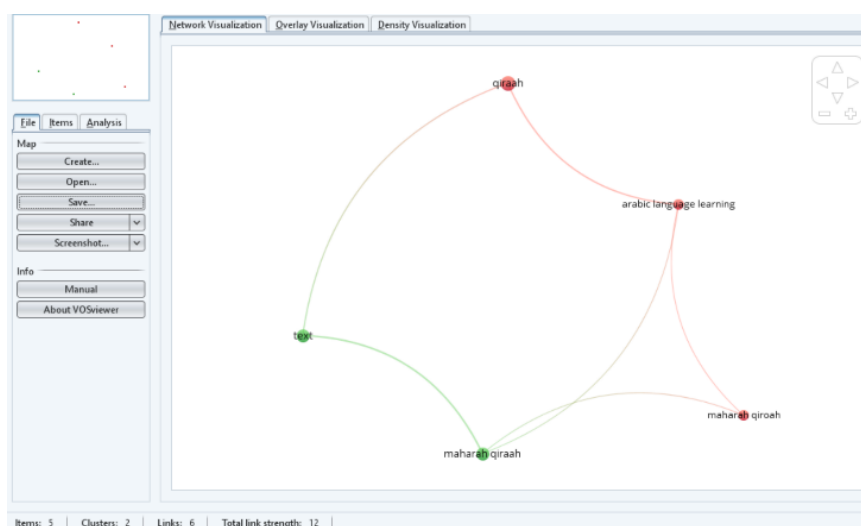
¹⁸ Suharia Sarif and Amran AR, 'Efektivitas Artificial Intelligence Text to Speech Dalam Meningkatkan Keterampilan Membaca', *Jurnal Naskhi Jurnal Kajian Pendidikan Dan Bahasa Arab*, 6.1 (2024), pp. 1–8, doi:10.47435/naskhi.v6i1.2697.

¹⁹ Nur Laili Indasari and Corresponding Author, 'Pemanfaatan Aplikasi Text to Speech Untuk Pengembangan Materi Listening Berbasis Kearifan Lokal', 17.1 (2025), doi:10.35457/konstruk.v17i1.4042.

²⁰ Sakinah Pokhrel, "Manajemen Pembelajaran Berbasis Digital Dalam Meningkatkan Keterampilan Membaca Al-Qur'an," *Ayaq* 15, no. 1 (2024): 37–48.

effective in supporting *maharah qira'ah* learning. In addition, it is necessary to analyze the various platforms and software available to determine the best method in integrating tts into the Arabic language learning curriculum more broadly.

From the results of the problems above, the researcher wants to conduct a study entitled "Literature Analysis on the Implementation of *maharah qira'ah* Digital Media Based on Text to Speech". The reason the researcher took this study was based on the results of the analysis with the number result 100 with 2019-2024 with the keyword "media digital *maharah qira'ah* based on text to speech", then the researcher conducted an analysis to determine the state of the art through the VOS viewer application, the total link strength was 12, links 6, clusters 2, therefore based on the VOS viewer analysis, the study entitled "Literature Analysis on the Implementation of Digital Media *Maharah Qira'ah* Based on Text To Spech" is still worthy of further research.



Picture 1. Vosviewer

The purpose of the study for the literature review entitled "literature analysis on the implementation of digital media *maharah qira'ah* based on text-to-speech" are:

1. Identifying the basic concept of *maharah qira'ah*
Explaining the meaning, purpose, and important aspects of reading skills (*maharah qira'ah*) in Arabic language learning
2. Analyzing the role of digital technology in *maharah qira'ah* learning
Reviewing various forms of digital media and exploring the advantages and challenges in implementing digital media to improve reading skills

3. Exploring the implementation of text-to-speech (tts)

In *maharah qira'ah* learning Analyzing how text-to-speech (tts) technology can support *maharah qira'ah* learning

4. Identifying the benefits of tts in improving reading comprehension, pronunciation, and fluency in reading Arabic texts.

5. Examining the effectiveness of tts-based digital media in *maharah qira'ah* learning and analyzing the results of previous studies related to the use of text to speech in the pursuit of *qira'ah*.

Method

This study uses a literature review method, which is an approach taken by reviewing and analyzing various relevant scientific literature sources to gain a comprehensive understanding of the implementation of digital media based on Text-to-Speech (TTS) in *maharah qira'ah* learning. The literature reviewed includes journal articles, reference books, research reports, and other academic documents published in the period 2019 to 2024. Literature searches were conducted through online databases such as Google Scholar, Scopus, and science direct using the keywords "media digital *maharah qira'ah* text to speech". Inclusion criteria were determined based on the relevance of the topic, the credibility of the source, and the availability of adequate information regarding the effectiveness and challenges of using TTS in Arabic language learning. Literature that did not discuss TTS explicitly or was not relevant to Arabic reading skills was excluded from the analysis.

The systematics of the study, in this method is divided into several subsections, namely: (1) literature data collection techniques, (2) literature selection criteria, and (3) data analysis techniques. Data collection is carried out systematically, while analysis is carried out with a descriptive-qualitative and comparative approach. The VOS viewer application is used to help visualize literature maps (state of the art), such as total link strength and grouping (clusters) of various scientific publications studied.

The characteristics of the participants in this study are not individuals, but rather scientific documents or academic literature that are the objects of study. The subjects of the literature include research involving students, university students, teachers, and users of TTS technology in the context of Arabic language education. Some literature even specifically examines students with special needs such as the blind, who are one of the

largest beneficiary groups of TTS technology. The selection of study subjects was carried out by considering the diversity of study backgrounds, methods used, and findings reported in each publication.

This research design is descriptive-qualitative with a systematic approach to literature review.²¹ This study did not involve direct manipulation of the subjects, but rather observation of the results of existing studies. Data were analyzed to identify trends, patterns, key findings, benefits, and challenges of implementing TTS in *maharah qira'ah* learning. In addition, a comparative approach was used to compare the effectiveness of various TTS media in the context of learning to read Arabic. With this structure, this study is expected to provide a complete picture of the contribution of TTS technology to the development of reading skills in Arabic and provide a foundation for further research in the future.

Results and Discussion

The following is a table of results and discussion of "Literature Analysis on the Implementation of *Maharah Qira'ah* Digital Media Based on Text to Speech".

No	Researchers and Years	Title Research	Research methods	Research result
1	Muhammad Fathan Ramadhan, Suhirman, 2024	Inclusive Android-Based Solution: E-Book Reader Application with Text-To-Speech for Empowering People with Disabilities	Quantitative	Text to speech e-book reader applications can be an effective solution in supporting literacy and accessibility for all groups.

²¹ Ridwan and others, 'Pentingnya Penerapan Literature Review Pada Penelitian Ilmiah'.

2	Suharia Sarif, Amran AR., 2024	Efektivitas Artificial Intelligence Text to Speech dalam Meningkatkan Maharatul Qiraah	Qualitative	AI Text to Speech (TTS) technology improves speaking skills by giving users access to .
3	Muhammad Husni Mubarak, 2023	Student Perceptions in Using Text to Speech Based Applications in Arabic Language Learning Technology Courses	Quantitative	The use of the text to speech application (naraaket.com) received a good category.
4	Lia Suci Fitriawati, Arif Bijaksana Putra Negara, Rudy Dwi Nyoto, 2020	Implementasi Text To Speech Pada Website Menggunakan Metode Shallow Parsing	Shallow parsing	The implementation of text to speech on the website was successful and could run as expected and the process of breaking down text into truncated text on the server could run as expected.
5	Titis Pawiyati RP Pramono, 2022	Improving Students' Ability in Speaking of Procedural Text with Balabolka ('Text to Speech')	Qualitative	Balabolka Text to speech' to raise the students' skill to produce Oral Procedural Text, especially about the Manual and Tips.

6	Fadhil, 2023	Artificial Intelligence in Language Education	Qualitative	AI, including TTS, can be personalized according to the learner's needs.
7	Rindu Refoina Pertiwi, 2024	Utilization of Text to Speech and Voice Changer Technology in Indonesian Language Learning	Qualitative	Text to Speech and Voice Changer technology provides new opportunities for teachers and students to improve the quality of Indonesian Language and Literature learning.
8	Dede Kurniadi, Fitri Nuraeni, Indra Trisna Raharja, Asri Mulyani, 2019.	Designing Text To Speech Applications In Indonesian Using Firebase Machine Learning Kit Based On Android	Extreme programming (xp).	The text to speech application has been running properly according to the test results and this application is equipped with a save to file .txt feature, copy text to clipboard, translate to Indonesian and can output 34 language dialects.
9	Siti & Hasan, 2022	Qira'ah Learning Strategy Based on Technology	Case study	Integration of voice-based technology increases students' motivation in learning to read.

10	Lia Suci Fitriawati, Arif Bijaksana Putra Negara, Rudy Dwi Nyoto, 2020	Implementation of Text To Speech on Website Using Shallow Parsing Method	Research flow chart	The implementation of text to speech on the website was successful and could run as expected and the process of breaking down text into truncated text on the server could run as expected.
11	Muhammad Husni Mubarak, Agung Budi Santoso, 2023	Student Perceptions in Using Text to Speech Based Applications in Arabic Language Learning Technology Courses	Quantitative	Students' perceptions of the use of the text to speech application (naraaket.com) were categorized as good.
12	Suharia Sarif, Amran AR., 2024	Effectiveness of Artificial Intelligence Text To Speech in Improving Maharatul Qiraah	Qualitative	AI TTS can be a very effective tool in helping individuals overcome communication barriers and increase their confidence in public speaking.
13	Vadim Popov, dkk., 2021	Grad-TTS: A Diffusion Probabilistic Model for Text-to-Speech	Model eksperimental	Grad-TTS is capable of producing speech synthesis that is competitive with state-of-the-art models such as Tacotron2, both in terms of quality (based on Mean Opinion Score) and

				inference speed efficiency.
14	Dedi Mulyanto, dkk., 2024	Utilization of artificial intelligence with text-to-speech technology based on natural language processing to enhance arabic listening skills for non-native speakers	Qualitative	TTS is an effective tool to improve Arabic listening skills among non-native speakers.
15	Ashanti Widyana , Mohammad Iqbal Jerusalem, Budi Yumechas, 2022	The Application of Text-to-Speech Technology in Language Learning A Systematic Review	Preferred Reporting Items for Systematic Reviews and Meta-Analysis)	Text-to-speech (TTS) technology has a positive impact on language learning, especially in improving students' language skills such as pronunciation, reading, and vocabulary comprehension.
16	Muhammad Saripuddin, 2024	Utilization of Digital Media for Teaching the Qur'an and Hadith in the Digital Era	Qualitative	The use of digital media such as digital Qur'an applications, online interpretation platforms, and interactive videos significantly increases the flexibility, effectiveness, and engagement of students in learning.

17	Putri Susana Bela, Karimatul Hidayah, Ahmad Mulyadi, Nurman, dan Dessy Kurnia Mulyani, 2025	Utilization of Digital Media in Islamic Religious Education Learning in Nature-Based Schools	Eksperimen	The use of digital media such as mobile applications, interactive videos, and online platforms significantly increases millennial students' interest in learning Islamic Religious Education subjects.
18	Khansa Chemnad dan Achraf Othman, 2023	Advancements in Arabic Text-to-Speech Systems: A 22-Year Literature Review	Systematic literature review	<i>The most common technique used in Arabic TTS is concatenative synthesis, deep neural networks (DNN), dan hidden Markov models (HMM).</i>
19	Anang Darun Naja dan Miftakhul Rohman, 2023	The Effectiveness of Empowering the Qur'an in the Qiro'ah Sab'ah Method	Phenomenological approach	The integration of digital media in Qiro'ah Sab'ah learning can increase the effectiveness, accessibility, and involvement of learners in understanding tajwid and reading the Al-Qur'an.

20	Hajar Nurma Wachidah, 2023	Digital Visual Literacy: Using Digital Book Creator as a Media for Developing Arabic Language Teaching Materials (Maharah Kalam) for Students in Higher Education Environments	ADDIE	This study also found that the digital visual literacy approach is able to increase students' participation, creativity, and understanding in learning Arabic, as well as opening up opportunities for more flexible learning in the digital era and society 5.0.
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Based on the results of the literature review, it was found that Text-to-Speech (TTS) technology has a positive impact on learning *maharah qira'ah*. Several studies have shown that TTS helps students in pronunciation, understanding meaning, and learning motivation. In addition, the use of digital media in Arabic language education in general has also been shown to increase the effectiveness of learning by providing a more interactive and personal learning experience.²²

Several challenges are still found in the implementation of this technology, such as the limitations of Arabic pronunciation by the TTS system, the lack of integration with the curriculum, and the need for adequate devices. Therefore, further research is needed to develop a more optimal TTS-based learning model for *maharah qira'ah*. The implementation of digital media in Arabic language learning, especially in improving *maharah qira'ah* (reading skills), has experienced significant development along with the advancement of information technology.²³ One of the innovations that has begun to be widely discussed in the literature is the use of text to speech (TTS) technology as a supporting medium in learning to read Arabic texts. Analysis of various literatures shows

²² Maryam Nur Annisa, Muhammad Rifki, and R. Taufiqurrochman, 'Tekhnologi Media Pembelajaran Berbasis Video Animasi Untuk Meningkatkan Kemampuan Berbicara Bahasa Arab Siswa Di Madrasah Ibtidaiyah Negeri 2 Kabupaten Gorontalo', *Jurnal Sustainable*, 6.2 (2023), pp. 378–88.

²³ Dkk Rika Widianita, 'Implementasi Literasi Digital Pada Pembelajaran Maharah Qira'ah Al-Mutawassithah', *AT-TAWASSUTH: Jurnal Ekonomi Islam*, VIII.I (2023), pp. 1–19.

that this technology has a positive impact, although there are still several challenges that need to be studied further.

Several studies have suggested that the use of text to speech can improve students' understanding of the phonetic structure of Arabic, especially in recognizing the correct makharijul huruf and intonation. This is very crucial in learning qirā'ah, considering that Arabic has a complex phonological system that is different from Indonesian. With TTS technology, students can hear the correct pronunciation of the Arabic text they read, thus helping to strengthen their understanding and pronunciation simultaneously.

This study aims to thoroughly investigate the concept, benefits, challenges, and prospects of implementing digital media based on Text-to-Speech (TTS) in improving reading skills (*maharah qira'ah*) in Arabic language learning. The problems raised in the introduction state that learning *maharah qira'ah* is faced with various serious challenges, such as students' low understanding of phonetics, limited interactive learning media, and the dominance of conventional methods that are less adaptive to the development of the times. In this context, learning to read Arabic not only requires technical skills in pronouncing letters and words, but also demands a deep semantic understanding and prosodic awareness of *harakat*, *makhārij al-ḥurūf*, and syntactic structure of the text. Therefore, mastery of *maharah qira'ah* cannot be separated from a simultaneous phonological, morphological, and semantic approach. The basic concept of *maharah qira'ah* is understood in this study as the ability to identify, understand, and reconstruct the meaning of a written text in Arabic, which is essentially closely related to the ability to recognize word forms, sentence structures, and context of meaning. Based on literature analysis, researchers found that the learning objectives of *maharah qira'ah* include the ability to read with correct pronunciation, understand the contents of the reading contextually, and develop critical thinking skills in responding to texts. These skills also serve as a bridge for students to understand classical and modern Arabic books, which are very important in Islamic education and scientific studies.²⁴ In facing these challenges, the development of information technology offers various alternative solutions, one of which is through the use of digital media based on Text-to-Speech (TTS).

²⁴ Putri, 'Mafhum Maharah Qiraah Dan Maharah Kitabah'.

TTS is a technology that automatically converts text into sound, allowing students to hear Arabic pronunciation with the help of a machine. This technology has been proven in several studies to help students improve pronunciation, improve understanding of Arabic phonemes, and strengthen their confidence in reading texts independently. Several studies reviewed in this study show that TTS can encourage more inclusive learning, especially for students with visual impairments or dyslexia. For example, research by Muhammad Fathan Ramadhan and Suhirman shows that the use of TTS-based e-book readers can empower students with special needs through audio access to reading materials. Meanwhile, the results of a study by Suharia Sarif and Amran AR revealed that artificial intelligence-based TTS contributes greatly to improving reading skills (*qirā'ah*) by strengthening pronunciation and intonation structure. Moreover, the results of the literature review also show that the use of TTS-based digital media provides pedagogical advantages such as flexibility in learning time, increased student participation, and strengthened intrinsic motivation. In this context, TTS supports self-regulated learning, which gives students full control over when and how they access reading materials. For example, applications such as Balabolka and Narakeet have been shown to be used repeatedly, helping students hone their pronunciation and reading fluency according to their individual needs. In fact, according to a study by Ashanti Widyana et al., TTS generally has a positive impact on language skill acquisition, especially in terms of pronunciation, vocabulary enrichment, and reading comprehension. Technically, TTS models such as Grad-TTS developed by Vadim Popov et al.²⁵ has been able to produce a more natural sound quality, which can be compared to the performance of popular models.

The research results also noted various challenges that need to be considered in the implementation of this technology. One of the most prominent challenges is the incompatibility of TTS sound quality to the complex phonology of Arabic. Many TTS systems still have difficulty distinguishing harakāt, voicing tanwīn, or reading text with correct tajwīd, which has the potential to cause misconceptions of meaning for students.²⁶ On the other hand, the limitations of digital infrastructure in educational institutions, such as the availability of devices, internet connections, and teacher competence in integrating

²⁵ Vadim Popov and others, 'Grad-TTS: A Diffusion Probabilistic Model for Text-to-Speech', *Proceedings of Machine Learning Research*, 139 (2021), pp. 8599–8608.

²⁶ 'Advancements_in_Arabic_Text-to-Speech_Systems_A_22-Year_Literature_Review (1).Pdf.Crdownload'.

technology, also hamper the optimal use of TTS in *maharah qira'ah* learning. In addition, many curricula have not explicitly included the use of TTS as part of an integrated learning strategy, so its use is still additional and unsystematic.²⁷

The literature analysis conducted in this study is supported by bibliometric mapping using the VOSviewer application, which shows that the topic of "text to speech-based digital *maharah qira'ah* media" is still relatively new and has wide room for development in the future. With the total link strength and clusters still limited, the researchers recommend the need for further studies to build a TTS system that is more sensitive to Arabic phonetic characteristics, TTS integration in competency-based learning curriculum, and teacher training in utilizing this technology as part of a modern pedagogical approach. The conclusion of this study strengthens the view that TTS is not just a technical aid, but is a transformational media in Arabic language learning that can significantly improve students' reading competence, while supporting the principles of inclusivity, effectiveness, and sustainability of education in the digital era.

In this literature review, a number of quantitative data were found that strengthen the urgency and effectiveness of implementing Text-to-Speech (TTS) technology in *maharah qira'ah* learning. First, based on the results of a literature search through various scientific databases with a time span of 2019 to 2024, 100 articles were found that were relevant to the keyword "text-to-speech-based digital *maharah qira'ah* media". These findings were further analyzed using the VOS viewer bibliometric application, which produced data in the form of a total link strength of 12, the number of connections between references was 6, and there were 2 main clusters that described the grouping of topics in the study. These data show that although this topic is still relatively new in the academic world, its potential is very large to continue to be developed. In addition, several studies reviewed also provide direct quantitative evidence. Research by Muhammad Fathan Ramadhan and Suhirman (2024) used a quantitative approach and found that the use of TTS-based e-book reader applications was effective in increasing literacy and accessibility for all groups, including students with special needs. Meanwhile, research by Muhammad Husni Mubarak also used quantitative methods and concluded that the use of the TTS application (narakeet.com) received a "good" category rating from students in the Arabic Language Learning Technology course. The same

²⁷ Muhammad Husni Mubarak and Agung Budi Santoso, 'Persepsi Mahasiswa Dalam Penggunaan Aplikasi Berbasis Text to Speech Pada Mata Kuliah Teknologi Pembelajaran Bahasa Arab', *Jurnal Ilmiah Iqra'*, 17.1 (2023), p. 73, doi:10.30984/jii.v17i1.2376.

results were confirmed again in Mubarak's study with Agung Budi Santoso, which showed the consistency of students' positive perceptions of the use of TTS in the learning process. These quantitative data confirm that the implementation of TTS not only has a positive influence conceptually, but is also empirically proven to increase the effectiveness and quality of Arabic language learning, especially in the reading aspect.

On the other hand, the literature also shows that TTS-based digital media has a contribution to self-directed learning. As shown by a study by Suharia Sarif Amran AR (2024), students feel more confident and motivated in reading Arabic texts because they can access text readings at any time and repeat pronunciations according to their needs.²⁸ This is in line with the modern learning approach that emphasizes technology-based learning and flexible learning time. However, implementation challenges are also found in several studies. One of them is the limited quality of TTS sound in Arabic which is sometimes less natural or does not match the semantic context of the text. Some TTS applications have not been able to distinguish harakat with high accuracy, which can lead to misinterpretation of meaning. In addition, in the context of education in Indonesia, the limited devices and technological infrastructure in several educational institutions are obstacles to the maximum utilization of TTS.

From the results of the literature analysis, it can be concluded that digital media based on text to speech has great potential in supporting *maharah qira'ah* learning, especially in terms of phonetics, learning motivation, and flexibility of use. However, its effectiveness is highly dependent on the quality of technology, the readiness of educators to integrate it, and infrastructure support. Therefore, further research and development of TTS technology specifically for Arabic with more sophisticated educational features need to be carried out continuously.

Conclusion

Based on the results of the analysis of various literatures, it can be concluded that the use of digital media based on Text-to-Speech (TTS) technology in learning *maharah qira'ah* has great potential in improving the competence of reading Arabic texts. TTS technology has been proven to help students understand the correct pronunciation, improve pronunciation, and increase learning motivation and student involvement in the learning process. The use of TTS not only provides easy access to reading materials, but

²⁸ Sarif and AR, 'Efektivitas Artificial Intelligence Text to Speech Dalam Meningkatkan Keterampilan Membaca'.

also supports independent and inclusive learning, especially for students with special needs such as visual disabilities. With repeatable audio features, students can adjust the learning process according to their individual needs. This is very relevant in the context of modern education that emphasizes flexibility and personalization of learning. However, the implementation of TTS in Arabic language learning still faces several challenges. Among them are the sound quality and accuracy of pronunciation in Arabic which are not yet fully optimal, limitations in distinguishing harakat and intonation, and the uneven distribution of digital infrastructure in educational institutions. In addition, the integration of this technology into the learning curriculum also requires a mature strategy and training for educators.

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