INJECT (Interdisciplinary Journal of Communication)
p-ISSN: 2548-5857; e-ISSN: 2548-7124
Vol. 10. No. 1 June 2025: p. 115-132
DOI: https://doi.org/ 10.18326/inject.v10i1.4383

Evaluating The Readability of Jawi To Latin Transliteration Via AI-Based Text Photography Applications

Najihatul Faridy*
Management, Universitas Samudra
Najihatul.faridy@unsam.ac.id

Allif Syahputra Bania
English Education Department, Universitas Samudra
allifbania@unsam.ac.id

Bachtiar Akob
History Education Department, Universitas Samudra
bachtiarakob@unsam.ac.id

Abstract

Jawi script has lost its edge as a unifying language in the archipelago and is included as a means of communication that is starting to fade. So it is necessary to make efforts to embed digitalisation of Jawi script in order to maintain Indonesian culture in learning materials that can be accessed by the wider community using the help of the internet. In this era of artificial intelligence, there are translation machines that utilise text photography that can translate between languages, so this research focuses on efforts to preserve the Jawi script through aspects of readability for the younger generation. The research was qualitative by implementing trial and error test methods and distributing questionnaires, with the results that the use of effective applications is still limited to translation between languages with the same script, but the application requires updates and upgrades to be able to translate between scripts.

Keyword: Artificial Intelligance; Jawi Script; Latin Script; Text Photography Application; Transliteration

Introduction

Jawi script is a cultural heritage of the ancestors of the Acehnese people that makes the entire archipelago proud as a work of art that is international in nature in terms of the dissemination of information and knowledge that spans modern countries such as Indonesia, Malaysia, Brunei Darussalam, Mindanao in the Philippines, and Pattani in Thailand where the unifying language of these regions is Malay but uses the hijaiyah letters without harakat (Ramala, 2020; Bania & Akob, 2025).

Malay language as a legendary means of communication in the archipelago as a language used in Jawi script texts has similarities with the Indonesian language known today where the use of the term basic words is equally applied, but what distinguishes it is that basic words in Indonesian are one unit, but in Malay with Jawi script they are not in one unit, which means that the basic word consists of more than one syllable with the nature of an open syllable or a closed syllable, where since 2016 open syllables and closed syllables are no longer recognised in the general guideline for Indonesian spelling (Melinda et al., 2024).

At first, the Jawi script dominated as a means of communication in the archipelago before the use of the Latin script succeeded in replacing the popularity of Jawi script. The Jawi script consists of 28 hijaiyah alphabets (Arabic letters) and the addition of 5 letters such as "cha", "pa", "nga", "ga", and "nya", which are representatives of the Malay language phenomenon that is not found in the hijaiyah (Abdullah et al., 2020). The diacritical marks in Arabic hijaiyah letters, namely ـَ, ـِ, and ـُ, used to indicate the vowel phonemes /a/, /i/, and /u/, were not written in communication using the Malay language in Jawi script. Then, vowel phonemes were expressed using the letters alif or ا for the sound /a/, wau or و for the sound /u/ and /o/, and ya' or ي for the sound /i/ and /e/ (Mukhamdanah et al., 2023).

Jawi script has a big role in tradition as a means of communication that has an impact on the development of the Malay language and the spread of Islam in the Malay world. The significant contribution obtained from understanding the Jawi script is evident in terms of attitudes towards religion and the impact on worship, moral formation, social, and customs so that the preservation of this ancestral culture has a large role in forming

religious attitudes, family harmony, reviving traditions and celebrations of big days and uniting society (Zulkhairi & Hajar, 2023).

One of the factors of the decline of the use of jawi script, especially in Aceh as the veranda of Mecca where Islamic civilisation in Southeast Asia was powerful in the sultanate phase was the Japanese occupation of Indonesia during 1942-1945 so that the use of jawi script was limited and directed at learning to use Katakana and Hiragama. Although experiencing rapid decline and leading to extinction, jawi script can still survive until now with the recommendation of the use of jawi script in Aceh through Qanun 2002, then support for implementation in Qanun 2008 No. 5 the year 2008, on the implementation of education, article 35, verse 4 (Rizki, 2020). Even further, the Jawi script, which should use the Malay language, occurred in the 21st-century phenomenon in Brunei Darussalam, where the Jawi script was phonetically transliterated into English, which in this era is an international language in the context of business, postcolonialism, modernity, and globalisation (Gu, 2025).

Nowadays, Jawi script has lost its edge as a unifying language in the archipelago and is included as a means of communication that is starting to fade and is heading towards scarcity and is feared to become extinct. So it is necessary to make efforts to embed digitalisation of Jawi script in this era of cutting-edge technology in order to maintain Indonesian culture in learning materials that can be accessed by the wider community using the help of the internet. Among them are efforts to preserve Jawi script by designing augmented reality based on Android by utilising Vuforia software that can be uploaded to the Play Store in the hope of attracting the interest of the younger generation in learning Jawi script (Hussudur & Pangaribuan, 2023). Then, according to Razali et al. (2023) stated the main problem currently in the discussion of the Javanese script is that it is no longer used as official communication in countries that use Malay as a lingua franca and is only used in Islamic religious learning activities in Islamic religious schools or Islamic boarding schools. However, what is more important than just limited learning in Islamic boarding schools is how to maintain ancient relics written using the Jawi script which can be preserved in this technological era by storing them in the form of digital images and can be changed into script form to be read automatically using Optical Character Recognition (OCR) technology on computers.

In addition, the next way that can be developed in this modern era as support to maintain the existence of Jawi script, which is no longer familiar among the younger generation, is by fostering interactive interest in linguistic aspects in the form of understanding how to read and write Jawi script using the Arabic-Jawi lexilogos platform digitally with automatic Latin to Jawi script transliteration features, writing guides, and vocabulary references so as to contribute positively and maximally to the preservation of communication using jawi script (Junaidi et al., 2024).

However, all previous studies above are related to the preservation of jawi script with the help of current technology, but none have discussed technology that can read text to be translated via artificial intelligence applications by utilising photography that can read jawi script in Latin script, even though Google, as a giant global technology company, has a feature known as Google Lens. Google Lens is an application that can utilise the photo feature on a smartphone to translate text in real-time (Nuraini et al., 2022; Rachmayanti & Alatas, 2025). In supporting real-time translation, Google Lens contains a variety of languages as a global translation learning tool where interactive features allow word pronunciation to be heard when the word is tapped, can even get the definition of the target word, and can even show examples of the use of the translated word to provide easy understanding for users (Rahmawati et al., 2024). Furthermore, as a photography-based artificial intelligence that has significant benefits in quality translation over time, Google Lens is used to translate various types of reports, including notes, reports, and recipes. Even blind people who have visual impairments can be helped by this AI-based photography application with its voice translate feature (Kaliyadan et al., 2021). Due to the usefulness of AI-based photography applications in helping users understand, this study focuses on the readability quality of Jawi script to Latin script via Google Lens.

Thus, Current AI applications fail to address Jawi-Latin transliteration readability for non-experts. Due to the relationship of the decline of jawi among the younger generation who consider jawi as a second caste language and are not interested in learning it traditionally, the purpose of this study is to preserve jawi with the help of artificial intelligence that is rampant in the digital age so that this culture does not become extinct, especially in intersemiotic translation, which is a translation of a language

in the form of text that has non-text differences such as between scripts where one of them uses a script which is known as the hijaiyah script and the other is the Latin alphabet.

Research Method

This research is qualitative research, which is described clearly. This research is intended to understand opinions, ideas and experiences from research dominated by non-numerical data in the form of text or even photo images, where the target of this research is to gain new perspectives (Ugwu & Eze, 2023). Then, the method in this research emphasises a deep understanding of the context in gaining insight from authentic experiences by being loyal to the procedural, rigor and methodological foundations that have academic integrity. The power of exploration in conducting this qualitative research is driven by the ability to obtain contextual depth and holistic perspectives that are interwoven with the challenges of the limitations of potential researcher bias, practical mitigation strategies, and constrained generalizability (Lim, 2025). So this study will explain the phenomenon of the results of AI-based photography applications on the aspect of readability of Jawi script to Latin, which is an intersemiotic translation (O'Halloran et al., 2016; Setiawati et al., 2020; Bania et al., 2021; Nuraini et al., 2022; Mowafy, 2024).

The data collected is in the form of Jawi script to Latin translation results in terms of readability via AI-based text photography carried out using a trial-and-error test method (Som et al., 2011; Strong & Boers, 2019; Yetti, 2021; Zhao & Solano-Flores, 2023; Bania & Akob, 2025).

The resulting data was analysed on the readability aspect using the parameters of Nababan et al. (2012). where there are three levels of categories, namely a high level of readability with a score of 3 where sentences, phrases, clauses, words or technical terms in the translation of the Jawi script to Latin can be easily understood by the reader, then a medium level of readability with a score of 2 when in general the data obtained can be understood by the reader but there is more than one reading to understand a certain part, and finally a low level of readability with a score of 1 if it is difficult to understand.

The questionnaire was also distributed openly through purposive sampling to the younger generation with the criteria of having studied

Islamic religious knowledge at a dayah or Islamic boarding school in Banda Aceh to determine their understanding of the use of translation applications via AI-based text photography in translating Jawi script into Latin (Roopa & Rani, 2012; Taherdoost, 2022).

The number of experiments was carried out as many as three experiments, with the selection criteria for photographic results produced consecutively between one to three experiments from the application presented by Google Lens. From the results obtained, the transliterated sentence will be given a value according to the readability parameters by asking respondents to read to find out whether there is ease or difficulty in reading the transliteration results, so that they can fill out the questionnaire according to the phenomena that occur. After the data results have been prioritised by the respondents who are students from the dayah in Rukoh, Banda Aceh, the data is then presented by reducing the data, namely sorting the data that is read according to the target language dictionary to determine the level of ease or difficulty to understand and linked to the justification in the answer key that has been provided, then the data is described which words are read and which are not read and adjusted whether the read word is in accordance with the meaning in the answer key and conclusions are drawn about the effectiveness of Jawi to Latin transliteration using the photography application (Miles & Huberman, 2005; Bania & Imran, 2020).

Results and Discussion

A. Readability Level of Jawi to Latin Via AI-Photography Application

Jawi script, which was analysed for readability aspects through intersemiotic translation via an AI-based text capture application, was taken from Akbar and Abidin (2022) with the title " Pelatihan Membaca Aksara Pegon Dan Arab Melayu Pada Naskah Kuno Di Pondok Pesantren Muhammadiyah Darul Arqam Depok", as follows:

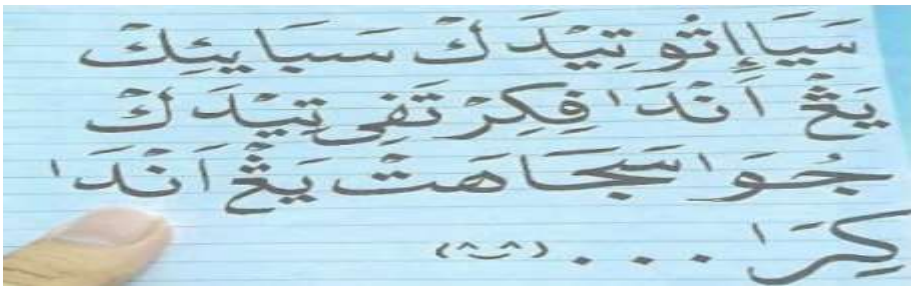

Figure 1. Jawi Script as Source Language

The answer key to the reading can be translated into Latin in Malay as follows: "*Saya itu tidak sebaik yang anda fikirkan tapi tidak juga sejahat yang anda kira*" or "I am not as good as you think but I am not as bad as you think" in english. Before starting to use the application, the language selection is set from the source language as "Malay (Jawi)" to the target language as "Malay" non-Jawi, as seen in the following picture, which is marked with a check mark:

Figure 2. Language Option in Application

The following are the translation results using the AI-based text capture application from Figure 1 with Jawi script, which is translated intersemiotically into Latin, such as:

Figure 3. Trial and Error: First Experiment Results

In the first experiment of using the text capture application with the language option from the source language of Malay (Jawi) to the target language of Malay (not Jawi), the following results were obtained in Latin: "*Saya Eto Tidak Sabaaik Ya Anda Fikr Tffi Tedak Joasjaaht Yagh Anda*". From this data, it was found that several words such as "Saya" or “I” in english, "Tidak" or “No” in english, and “Anda” or "You" in english could be read by the application, but the majority of the series of sentences received a score of 1, which means that the level of readability is low because the reading is difficult to understand. Even the Jawi at the end of the sentence is not changed to Latin.

Related to good readability as learning with internet-based media can convey information interactively so as to increase the interest of readers as users (Dewi et al., 2024). However, the readability in this first experiment is low readability so it can be concluded that even though the media used is internet-based, it cannot increase interest and cannot convey information interactively. Likewise, in Sofie and Ayuningtias (2023) which provides an explanation according to the readability parameters used in analysing the level of readability in this study, the translation results should be able to provide a clear message from the source language to the target language to make it easier to read and understand by the reader. However, the first trial-and-error experiment from Jawi script to Latin was not easy for the reader to understand.

Figure 4. Trial and Error: Second Experiment Results

In the second experiment, the intersemiotic translation from Javanese to Latin became "Saya Ato Tidka Sabaink Ya'a Anda Fikr Taffi Tbdyk Joa Sjamat Ya'a Anda Kara", only the words "Saya" or "I" in english and "kamu" or "you" in english were obtained, namely two readable words, which were fewer words than the first previous experiment, which obtained three readable words. The similarity with the first experiment in this second experiment is that overall, the intersemiotic translation from Jawi to Latin obtained a score of 1, which means the translation quality is low.

According to Akbari et al. (2017) in terms of the readability aspect of a text refers to the level of difficulty or ease for readers to understand. Readability is categorised as good if the reader is able to and can reason the translation results so as to increase motivation and interest in studying the text. However, in the results of this second experiment, readers were unable to reason and understand the results of the Javanese to Latin translation via the text shooting application properly. Likewise, Hakim et al. (2021) put great hope in the readability aspect as something that must be considered because of its extremely important nature, because readability affects the difficulty of understanding each section that is designed and evaluated in most textbooks. Thus, the results of the second experiment did not meet the criteria for good readability and deserve attention because of the difficulty in parts of the text to be read.

Figure 5. Trial and Error: Third Experiment Result

In this third trial and error experiment, it was found that the results of the Javanese translation into Latin, such as " *Saya akan tinggalkan awak, saya akan fikir tentang awak, saya akan berada dalam diri awak, saya akan*" or "I will leave you, I will think about you, I will be in you, I will" in english, experienced a significant transfer of the character form to Latin where each word could be read in Malay, such as the words saya", "akan", "tinggalkan", "awak", "fikir", "tentang", "berada", "dalam", and "diri". However, the series of words that have vocabulary in the Malay dictionary are confusing because they are not the actual meaning of the Jawi script and are very far from the actual answer key in Latin, such as *Saya itu tidak sebaik yang anda fikirkan tapi tidak juga sejahat yang anda kira*" or "I am not as good as you think but I am not as bad as you think" in english. Even the last word of the Javanese sentence has not been translated as was the case in the first attempt.

In Andriani et al. (2023) even though nowadays the completion of translation tasks by the younger generation is dominated by the help of features from translation machines including those made by Google, they cannot produce quality translations such as readability because there are many occurrences of grammar with an intolerable number and incorrect grammar so that it can be stated that it is still far from perfect which is likely due to still being in the development period and requiring system updates. Thus, especially the application used in this trial and error experiment, which is more sophisticated using a photography application, it is certain that it will require further development and updates.

B. Understanding Jawi to Latin Via AI-Photography Application

Regarding the understanding of the use of AI-based photography applications using smartphones with internet networks to translate source texts with Jawi script to Latin, it was given to 50 respondents who were selected using purposive sampling (Lenaini, 2021; Friday & Leah, 2024). Respondents came from the young generation of Aceh in Banda Aceh who met the criteria of having studied Islamic education in dayah or Islamic boarding schools, where they were asked to practice using AI-based photography applications to translate Jawi script into Latin and express the

phenomena experienced by filling out the form of the questionnaire provided. Information such as:

Table 1. Questionnaire on Understanding of AI Photographic Application

No.	Questions	Answer
1	Can you translate Jawi to Latin via an AI photography app?	100% Yes
2	Are the readability results good?	100% No
3	Do you understand the translation results?	100% No
4	Do you recommend Jawi to Latin translation via an AI photography app?	100% No

From the questionnaire, information was obtained that all respondents, totalling 50 or 100%, admitted that they understood the use of AI-based applications using AI photography to translate intersemiotically with the help of internet-based smartphones from Jawi script to Latin. In Alatas et al. (2024), it is known that the use of text translation technology in the form of using text photography from Google Lens is an alternative solution to replace traditional translation because it allows text to be translated in real-time using a smartphone effectively. However, what distinguishes previous research from this research is that Alatas explains the use of translation using an AI-based text photography application from Google Lens by translating Latin script from the source language to the Latin script of the target language, while this research was conducted intersemiotically where the source language uses Jawi script which is converted to Latin script so there are two different scripts. The overall method of use is very easy, so that respondents have no trouble using the AI-based text photography application to translate.

For the second question related to the readability quality of the results of the Jawi to Latin translation via the AI-based text photography application, all respondents or 100%, answered no, because of the presence of two different scripts, so that the system may require an update and upgrade. In Roza (2017) explains the difficulties that occur when translating Jawi script and Latin, especially using an application system

that is not yet fully developed because the Arabic phonology system is different from the Malay phonology so that not all hijaiyah or Arabic script can be used appropriately to write Malay unless it is done by adding several diacritical points to indicate Malay sounds that are not found in Arabic, for example the letters p-c-g-ng-ny which do not change the original letter shape of the hijaiyah.

In the third question related to understanding the results of the translation of Jawi script to Latin, a total of 50 respondents, or 100%, answered that they did not understand when the translation was the result of the help of using a text photography application. Another weakness related to the understanding of Jawi in Mayuso et al. (2024) is that the use of Malay and Jawi languages is limited when studying in mosques or in Islamic halls, and their popularity is starting to fade among the younger generation.

In the last question, all respondents agreed not to recommend translating between scripts such as Jawi and Latin using the application before the application is fully developed to be better in the future. In Yusra et al. (2020) when the use of AI-based applications by means of text photography has not been able to produce good readability aspects, in an effort to prevent transliteration errors or transliteration from Latin to Javanese, a Java programming language was built which was designed based on the rules in the general guidelines for Arabic-Malay script. In the future, efforts will be made to create the opposite programming from Javanese to Latin. From the results of the translation analysis using Google Lens three times in a row in taking photos and translating Javanese into Latin, it is certainly different from Razali et al. (2023) and Alatas et al. (2024) where this research technology uses text retrieval technology from the camera feature developed by the Google company known as Google Lens and is examined intersemiotically where the source script and target script are different. Therefore, it can be inferred that temporary results with the technological capabilities of this text shooting application have not been able to produce good readability aspects.

Conclusion

The use of artificial intelligence-based applications for photographing to transliterated source language text to target language with the same script is an effective effort that is very useful in the world of translation in the digital era. However, problems arise and require better system upgrades and updates when this translation is done from Jawi to Latin because of the difference in scripts, where Jawi uses the hijaiyah script and some additional dots when there is Malay that is not found in Arabic. From the three trials and errors, only two to three words were found that could be read to be understood when the Jawi script was converted to Latin, while the other transliterations were mostly not readable and there were also scripts that were not transliterated into Latin, especially the words at the end of the sentence in the photo. Then, it was also found in the last test that the series of words in the sentence was transliterated into the Latin form known in the Malay dictionary, but the series of words was incorrect or did not match the answer key that had been provided. Basically, the use of this text photography application is easy to use by the younger generation to use, but it is not perfect for translating Jawi to Latin because of the difference in script. In the future, it is hoped that there will be a focus on translation via AI-based photography applications between scripts, thereby facilitating efforts to preserve the Jawi script in the archipelago as a proud Indonesian culture and communication that was once a lingua franca in the archipelago.

The conclusion of this study should emphasise the need for script-specific AI training data and collaboration with linguists. The study's contribution to preserving Jawi in the future can be implemented by developing a Jawi-Latin transliteration model using deep learning frameworks. The relationship between readability scores and cultural preservation goals is closely related because if the score is low, it is the same as this preservation being considered a failure, so it is recommended for related parties to be able to improve the system so that it can transliterate jawi script and Latin through the camera feature more perfectly so that it can be read well and obtain a high readability score for the sake of preserving cultural understanding of jawi script.

Acknowledgement

Thank to Kementerian Pendidikan Tinggi, Sains, dan Teknologi Republik Indonesia. And also thanks to Lembaga Penelitian dan Pengabdian kepada Masyarakat Universitas Samudra. This research is part of the fundamental-regular research with the implementation contract for operational assistance of state higher education program research in fiscal year 2025. 539/UN54.6/PT.01.03/2025 according to master contract number 104/C3/DT.05.00/PL/2025 dated May 28, 2025.

References

Abdullah, F., Rahman, A. H. A., Ali, A. M., Kadir, F. K. A., & Adam, F. (2020). Jawi Script and The Malay Society: Historical Background and Development. *International Journal of Management (IJM)*, 11(7), 68–78.

Akbar, D. W., & Abidin, Z. (2022). Pelatihan Membaca Aksara Pegon dan Arab Melayu Pada Naskah Kuno di Pondok Pesantren Muhammadiyah Darul Arqam Depok. *ABDINE: Jurnal Pengabdian Kepada Masyarakat*, 2(2), 143-153.

Akbari, T., Sonjaya, Y., & Anwar, S. (2017). Analisis Keterbacaan Mahasiswa Terhadap Buku Teks Terjemahan Materi Asam Basa. *EduChemia: Jurnal Kimia dan Pendidikan*, 2(1), 88-102.

Alatas, M. A., Romadhon, S., & Rachmayanti, I. (2024). Penggunaan Chat GPT dalam Pembelajaran Bahasa: Perspektif Mahasiswa Tadris Bahasa Indonesia IAIN Madura. *Social, Humanities, and Education Studies (SHEs): Conference Series*, 7(3), 1–23. Https://Jurnal.Uns.Ac.Id/Shes.

Andriani, R., Eriyanti, R. W., & Huda, A. M. (2023). Problem Dalam Menggunakan Mesin Terjemahan: Error Dalam Menterjemahkan Teks Bahasa Inggris ke dalam Bahasa Indonesia. *INNOVATIVE: Journal Of Social Science Research*, 3(3), 4385–4395.

Bania, A. S., & Akob, B. (2025). Preserving the Jawi script in Aceh: Assessing literacy, cultural heritage, and modern paradigm challenges. *Studies in English Language and Education*, 12(1), 457-470. https://doi.org/10.24815/siele.v12i1.36629.

Bania, A. S., & Imran. (2020). Analisis kemampuan literasi membaca siswa sekolah dasar di kota langsa. Best Journal, 3(2), 51–56. https://doi.org/10.30743/best.v3i2.2806

Bania, A. S., Nuraini, Nursamsu, & Akob, M. (2021). The Quality of Taxonomy Translation in English Indonesian Latin by Biological Education Students. *Jurnal Pendidikan Sains Indonesia*, 9(4), 694-710.

Dewi, N. A., Pratiwi, A. G., Choirunisa, M. A., Aprilianti, A. R., Rahmania, C., Utomo, A. P. Y., & Muhajir. (2024). Tingkat Keterbacaan dan Keefektifan Kalimat pada Teks Tajuk pada Harian Fajar edisi Januari 2024 sebagai Sumber Bacaan Siswa SMA. *Jurnal Bima: Pusat Publikasi Ilmu Pendidikan Bahasa dan Sastra*, 2(4), 1-23.

Friday, N., & Leah, N. (2024). Types ofPurposive Sampling Techniques withTheir Examples andApplication in Qualitative Research Studies. *British Journal of Multidisciplinary and Advanced Studies: English Lang., Teaching, Literature, Linguistics& Communication*, 5(1),90-99

Gu, C. (2025). Scripting English in Jawi: English disguised in Arabic-based 'Tulisan Jawi' in Brunei's linguistic landscape. *Asian Englishes*, 1–34. https://doi.org/10.1080/13488678.2025.2497010

Hakim, A. A., Setyaningsih, E., & Cahyaningrum, D. (2021). Examining the Readability Level of Reading Texts in English Textbook for Indonesian Senior High School. *Journal of English Language Studies*, 6(1), 18-35.

Hussudur, A. M., & Pangaribuan, H, (2023). Implementasi Augmented Reality Sebagai Media Pengenalan Aksara Arab Melayu Berbasis Android. *Jurnal Comasie*, 9(2), 155-165.

Melinda, D., Syafina, & Suyanto, E. (2024). Sejarah Penulisan Arab Melayu di Nusantara dan Hubungannya dengan Bahasa Arab: Telaah dari Kajian Pustaka. *Kaisa: Jurnal Pendidikan dan Pembelajaran*, 4(1), 1-10.

Junaidi, Azmi, N., Nurliza, E., Rasyid, H., & Wardani, V. (2024). Penggunaan Aplikasi Keyboard Lexilogos Arabic-Jawi dalam Mendukung Pembelajaran dan Pengembangan Literasi Digital di

Kalangan Mahasiswa. *Journal of Technology and Literacy in Education*, 3(3), 170-181.

Kaliyadan, F., Al Dhafiri, M., & Al Dossari, F. (2021). Online Translation Tools as an Adjunct in Teleconsultations. *Indian Dermatology Online Journal* 12(1):p 154-155.

Lenaini, I. (2021). Teknik Pengambilan Sampel Purposive Dan Snowball Sampling. *HISTORIS : Jurnal Kajian, Penelitian & Pengembangan Pendidikan Sejarah*, 6(1), 33-39.

Lim, W. M. (2025). What Is Qualitative Research? An Overview and Guidelines. *Australasian Marketing Journal*, 33(2), 199-229.

Mayuso, H., Chemo, S., Lehnuh, M., Madami, U., & Nugroho, T. (2024). Implementasi Pembelajaran Kitab Berbahasa Melayu Jawi pada Prathomsuksa Di Patani Thailand. *Asas Wa Tandhim: Jurnal Hukum, Pendidikan & Sosial Keagamaan*, 3(2), 99-112.

Miles, M.B. & Huberman, A.M. (2005). Qualitative Data Analysis (terjemahan). Jakarta, Indonesia: UI Press

Mukhamdanah., Firdaus, W., Inayatusshalihah., Hasina, F. R., Yulianti, S., Syamsurizal. (2023). Influence of the Arabic Script and Language on Acehnese Manuscript Kitab Tauhid. *Eurasian Journal of Applied Linguistics*, 9(1), 24-34. Doi: http://dx.doi.org/10.32601/ejal.901003

Mowafy, M. (2024). Meaning Does Not Have to be Rendered In Words: Intersemiotic Translation in Digital Religious Infographics. *Indonesian Journal Of Applied Linguistics*, 14(2), 361-377.

Nababan, M, Nuraeni, A, & Sumardiono. (2012). Pengembangan Model Penilaian Kualitas Terjemahan. *Kajian Linguistik dan Sastra*, 24(1), 39-57.

Nuraini, N., Bania, A. S., Faridy, N. ., & Nursamsu, N. (2022). Identification of Ornamental Plants Via Google Lens Based on Intersemiotic . *Jurnal Penelitian Pendidikan IPA*, *8*(3), 1243–1251. https://doi.org/10.29303/jppipa.v8i3.1627

O'Halloran, K. L., Tan, S., & Wignell, P. (2016). Intersemiotic Translation as Resemiotisation: A Multimodal Perspective. *Signata*, 7, 199-229. https://doi.org/10.4000/signata.1223

Rachmayanti, I., & Alatas, M. A. (2025). Transformasi Media Lensatara: Google Lens dalam Pembelajaran bagi Mahasiswa. *Entita: Jurnal Pendidikan Ilmu Pengetahuan Sosial dan Ilmu-Ilmu Sosial*, Spesial Edition(Renaisans 1st International Conference of Social Studies, 685-700.

Rahmawati, Y., Haryani, Sulistyorini, D., & Indriyati, R. (2024). Expanding English Vocabulary Using Google Lens: Insights From A Real-Time Translation. *Jurnal CULTURE (Culture, Language, and Literature Review)*, 11(2), 112-129.

Ramala, D. E. (2020). Aksara Jawi: Warisan budaya dan bahasa masyarakat alam Melayu dalam tinjauan sosiolingustik. *Jurnal ISLAMIKA*, 3(2), 1-13. https://doi.org/10.37859/jsi.v3i2.2000

Razali, S., Arnia, F., Muharrar, R., Muchtar, K., & Bintang, A. (2023). Improved Classification of Handwritten Jawi Script Based on Main Part of Script Body. *Jurnal RESTI (Rekayasa Sistem dan Teknologi Informasi)*, 7(1), 94-104.

Rizki, S. (2020). Nurturing Jawi Through Education: Mirroring Jawi Education in Aceh and Malaysia. *The Indonesian Journal of Southeast Asian Studies*, 3(2), 217-230.

Roopa, S., & Rani, M. S. (2012). Questionnaire Designing for a Survey. *The Journal of Indian Orthodontic Society*, 46(4), 273-277.

Roza, E. (2017). Aksara Arab-Melayu di Nusantara dan Sumbangsihnya dalam Pengembangan Khazanah Intelektual. *Jurnal Tsaqafah*, 13(1), 177-204.

Setiawati, I. A. M. F., Yadnya, I. B. P., & Aryawibawa, I. N. (2020). A Comparison Of Translation Readability Between Google Translate And Human Translator In The Medical Book Entitled'Medical-Surgical Nursing'. *Lingua Scientia*, 27(2), 65-76.

Sofie & Ayuningtias, N. (2023). Analisis Kualitas Terjemahan Pada Laman Web Kbri Beijing. *BAHTERA: Jurnal Pendidikan Bahasa dan Sastra*, 22(1), 90-101.

Som, H. M., Zain, J. M., & Ghazali, A. J. (2011). Application Of Threshold Techniques for Readability Improvement of Jawi Historical Manuscript Images. *Advanced Computing: An International Journal*, 2(2), 60-69.

Strong, B., & Boers, F. (2019). The Error in Trial and Error: Exercises on Phrasal Verbs. *TESOL Quarterly*, 53(2), 289-319.

Taherdoost, H. (2022). Designing a Questionnaire for a Research Paper: A Comprehensive Guide to Design and Develop an Effective Questionnaire. *Asian Journal of Managerial Science,* 11, 8 - 16.

Ugwu, C. N., & Eze Val, H. U. (2023). Qualitative Research. *Idosr Journal Of Computer And Applied Sciences,* 8(1), 20-35.

Yetti, D. (2021). An Analysis of Readability Level of Reading Material in English Textbook for First Grade of Senior High School. *Journal of Education and Teaching*, 2(1), 1-7.

Yusra, Fikry, M., Yani, S. S., Irsyad, M. & Sanjaya, S. (2020). Aplikasi Android untuk Alih Aksara Latin ke Arab Melayu dengan Pendekatan Berbasis Aturan. *Jurnal CoreIT*, 6(2), 117-121.

Zhao, X., & Solano-Flores, G. (2023). Test translation review: a study on discussion processes and translation error detection in consensus-based review panels. Frontiers in Education, 8:1303617. doi: 10.3389/feduc.2023.1303617

Zulkhairi, T., & Hajar, I. (2023). How Jawi Script Influences Religious Attitudes: An Evidence from Aceh. *Jurnal Ilmiah Peuradeun*, 11(2), 633-650. https://doi.org/10.26811/peuradeun.v11i2.922