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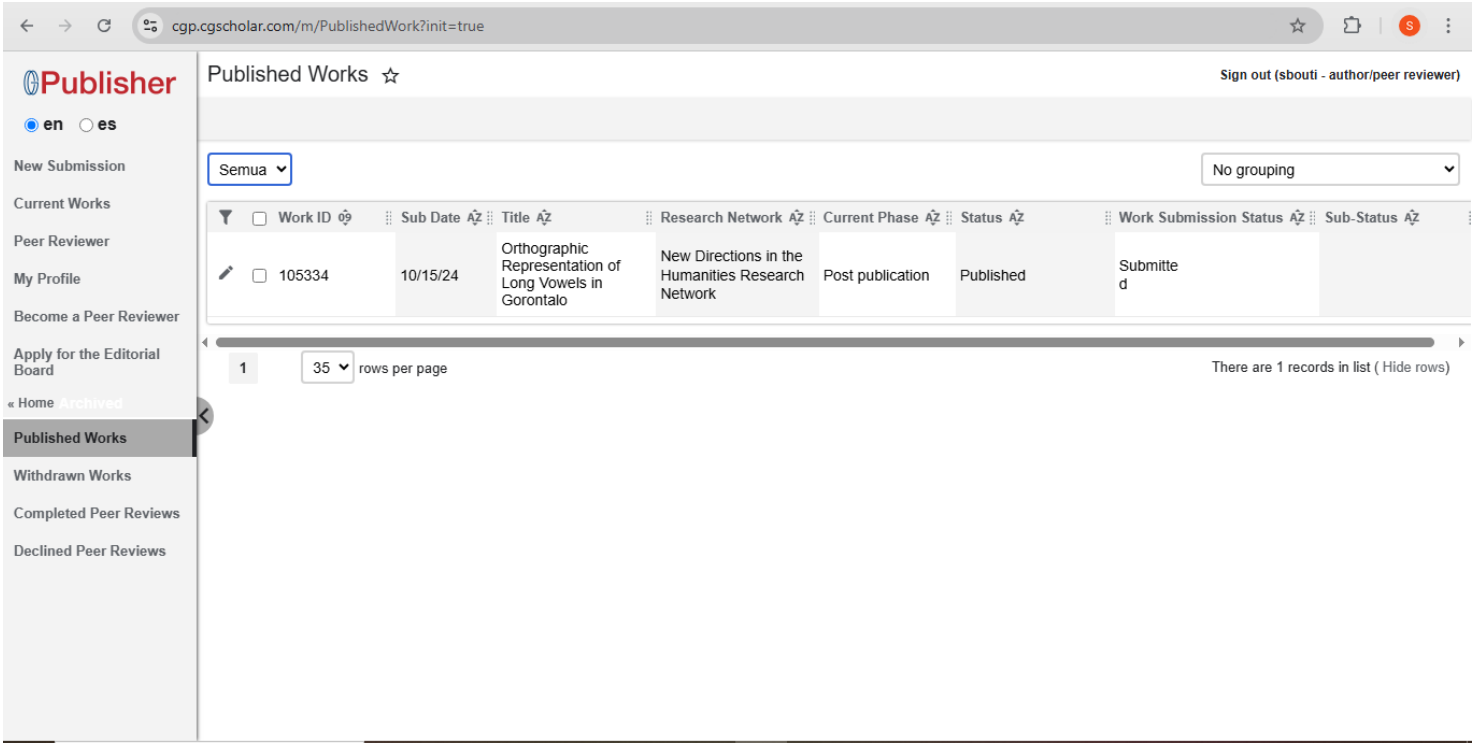

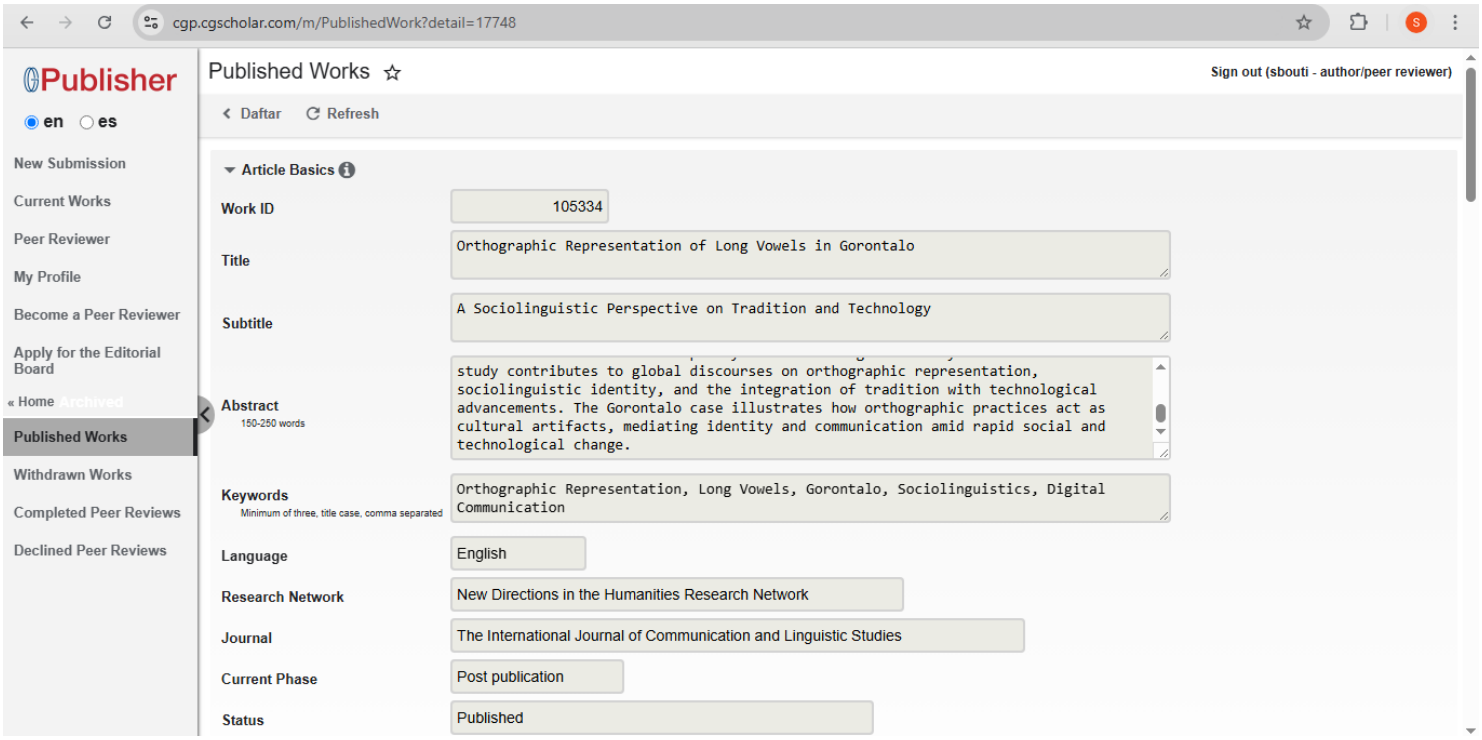
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Orthographic Inconsistencies in Long Vowel Representation in Gorontalo: A Linguistic and Sociocultural Analysis for Language Preservation

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Abstract

This study investigates the orthographic inconsistencies in the representation of long vowels in the Gorontalo language, focusing on the use of diacritics, digraphs, single graphemes, and the traditional Arabic Pegon script. The inconsistencies present challenges for language preservation, documentation, and standardization efforts. A mixed-methods approach was employed, involving 213 respondents from six regions in Gorontalo. Data were collected through questionnaires, interviews, and focus group discussions. The analysis focused on how different orthographic forms are utilized and the sociocultural factors that influence these practices. The findings reveal significant variations in long vowel representation across regions. Digraphs are the most commonly used method, while diacritics and the Arabic Pegon script are rarely adopted. The study highlights how education levels and sociocultural shifts influence these orthographic preferences, leading to regional differences and challenges in achieving orthographic standardization. The study concludes that while digraphs are prevalent, the lack of a unified system for representing long vowels in Gorontalo complicates language preservation efforts. Standardization and educational programs are necessary to promote consistent orthographic practices, particularly for future language documentation and preservation.

Keywords: Orthography, long vowels, Gorontalo, language preservation, digraphs, diacritics.

1. Introduction

Orthography plays a pivotal role in language preservation, especially for endangered languages, as it provides a standardized method of representing the sounds and structure of a language. In the case of the Gorontalo language, spoken predominantly in the Gorontalo province of Indonesia, inconsistencies in the representation of long vowels present significant challenges for language documentation, education, and transmission to future generations (Anderson, 2015; Coulmas, 2003). These challenges are exacerbated by regional variations in the use of diacritics, digraphs, and single graphemes, all of which contribute to difficulties in achieving a unified writing system for the language (Jones, 2012; Walters, 2017).

Long vowels, which can differentiate meaning in Gorontalo, are represented inconsistently across different regions. Diacritics such as the colon (u:) or macron (ū) are used in some areas, while others rely on simpler digraphs (aa, uu) or even single graphemes (a, u) (Smith, 2016; Sebba, 2007). This variability complicates communication and threatens the phonological integrity of the language, making it difficult for speakers to adopt a standardized orthography that can be universally taught and utilized (Jones & Clark, 2015). Without a consistent system for representing long vowels, Gorontalo risks further fragmentation in its written form, which could lead to a loss of linguistic and cultural identity over time (Walters, 2017; Fishman, 2001).

The use of diacritics in writing systems worldwide, including in Gorontalo, serves to clarify phonological distinctions, but their adoption is often hindered by a lack of formal education or technical limitations (Daniels, 2010; Coulmas, 2003). For instance, in urban areas like Kota Gorontalo, there is a higher tendency to use diacritics, whereas rural regions like Pohuwato and Boalemo tend to prefer simpler methods such as digraphs or unmarked vowels (Walters, 2017; Jones, 2012). Studies suggest that educational access and exposure to formal linguistic practices significantly influence the adoption of more complex orthographic systems (Anderson, 2015; Baker, 2011).

Digraphs, which involve the doubling of vowel letters to indicate length (e.g., aa or uu), offer a simpler and more accessible method for representing long vowels and are widely used in many languages with shallow orthographies (Rogers, 2005; Simpson, 2006). In Gorontalo, digraphs are especially prevalent in regions with limited formal education, where the use of diacritics may be impractical due to technological

constraints or a lack of familiarity (Walters, 2017). While digraphs provide a straightforward solution, their use contributes to regional variability in orthographic practices, which poses a barrier to standardization (Smith & Walsh, 2018).

Sociocultural factors also play a crucial role in shaping orthographic conventions in Gorontalo. Traditional scripts such as Arabic Pegon, once used widely in religious and cultural contexts, have largely fallen out of use, replaced by Latin-based scripts except in specific ceremonial settings (Yusuf, 2009; Anderson, 2015). This transition reflects broader cultural shifts driven by globalization and modern education systems, where the practical use of traditional scripts has diminished (Harris, 2013). The decline in the use of Arabic Pegon raises concerns about the loss of cultural heritage and highlights the need for balancing modern linguistic practices with efforts to preserve traditional writing systems (Errington, 1998; Sneddon, 2003).

The inconsistencies in orthographic practices not only affect language standardization but also have significant implications for education. In regions with more developed educational infrastructures, speakers are more likely to adopt formalized orthographic markers such as diacritics, while in rural areas, simpler forms such as digraphs or single graphemes dominate (Jones & Clark, 2015; Anderson, 2015). This divide underscores the need for educational interventions aimed at promoting consistent orthographic practices across all regions of Gorontalo to support both language preservation and effective communication (Walters, 2017).

Standardizing the orthographic representation of long vowels is essential for ensuring the survival of the Gorontalo language and preserving its phonological integrity. The development of a unified writing system that accounts for regional and sociocultural differences is crucial for maintaining linguistic continuity while also adapting to the modern educational and technological landscape (Smith, 2016; Walters, 2017). By addressing these orthographic inconsistencies, Gorontalo can enhance its language preservation efforts and foster a greater sense of cultural identity.

2. Literature Review

2.1 Orthographic Inconsistencies in Long Vowel Representation

Orthographic consistency is crucial for language preservation, especially in endangered languages like Gorontalo. In the case of Gorontalo, the

representation of long vowels has been inconsistent, with various methods employed across different regions. These methods include the use of diacritics, such as the colon (u:) and macron (ū), as well as digraphs (aa, uu), and single graphemes. This inconsistency complicates efforts to preserve the language and maintain its phonological accuracy (Coulmas, 2003; Jones, 2012; Walters, 2017). The lack of a unified orthography threatens both the language's phonological integrity and cultural heritage, highlighting the importance of developing a consistent system (Anderson, 2015; Smith & Walsh, 2018).

2.2 Linguistic Importance of Long Vowel Representation

Vowel length is a significant phonological feature in many languages, including Gorontalo, where it plays a crucial role in distinguishing word meanings and syntactical structures. Inconsistent representation of long vowels across regions results in communication barriers, affecting both the local population and broader educational contexts. Orthographic practices that fail to accurately represent vowel length can hinder language preservation efforts, as written forms are essential for documentation and transmission (Walters, 2017; Jones & Clark, 2015). Research shows that standardizing orthography is necessary to ensure languages like Gorontalo remain accessible to speakers and learners alike (Anderson, 2015; Spencer, 1997).

2.3 Diacritics: Theoretical Perspectives and Practical Challenges

Diacritics are essential in many writing systems for marking phonological distinctions, such as vowel length. In the case of Gorontalo, diacritics like the colon (u:) and macron (ū) are used by some speakers, particularly in urban areas, but remain uncommon in rural regions (Smith, 2016; Anderson, 2015). Although diacritics provide phonological precision, their adoption in Gorontalo has been limited, largely due to factors like lack of formal education and the challenges of using these symbols in digital communication (Daniels, 2010; Coulmas, 2003). Studies suggest that promoting the use of diacritics could enhance language precision, but widespread adoption is hindered by technological and educational barriers (Sebba, 2007; Walters, 2017).

2.4 Digraphs: A Simpler Alternative

In contrast to diacritics, digraphs (e.g., aa, uu) offer a simpler method for representing long vowels and are widely used in languages with shallow

orthographies (Simpson, 2006; Rogers, 2005). In Gorontalo, digraphs are particularly common in rural regions, where they are favored for their simplicity and ease of use (Walters, 2017; Brown, 2014). The use of digraphs reflects broader trends in low-resource languages, where practical considerations often take precedence over linguistic accuracy. However, the reliance on digraphs also contributes to regional orthographic variability, which complicates efforts to achieve standardization (Smith & Walsh, 2018; Nettle & Romaine, 2000).

2.5 Single Graphemes and Simplified Orthographies

In many regions of Gorontalo, particularly rural areas like Pohuwato and Boalemo, speakers often use single graphemes (e.g., a, u) to represent long vowels, foregoing diacritics and digraphs altogether (Jones & Foster, 2011; Anderson, 2005). This practice is common in informal writing and reflects the simplicity and practicality preferred by many speakers. However, the use of single graphemes can lead to ambiguity, especially for non-native speakers or learners unfamiliar with the nuances of spoken Gorontalo (Walters, 2017; Anderson, 2015). Simplified orthographies, while easier to use, pose challenges for language teaching and preservation, as they fail to capture important phonological distinctions (Brown, 2014; Spencer & Zwicky, 1998).

2.6 Sociocultural Influences on Orthographic Practices

The sociocultural context of Gorontalo significantly influences orthographic choices. Historically, the Arabic Pegon script was used in religious texts, but its usage has declined, with most speakers now relying on Latin-based orthographies (Yusuf, 2009; Anderson, 2015). The shift from traditional to modern orthographic systems reflects broader cultural changes, including globalization and the increasing influence of formal education (Errington, 1998; Harris, 2013). In contemporary Gorontalo, the use of traditional scripts like Pegon is limited to specific contexts, such as religious ceremonies, raising concerns about the loss of cultural heritage (Yusuf, 2012; Gauthier, 2010). Balancing the use of traditional and modern orthographies remains a challenge for language preservation.

2.7 Regional Variability in Orthographic Practices

Regional differences in educational access and cultural exposure contribute to variability in orthographic practices in Gorontalo. Urban regions, such as Kota Gorontalo, are more likely to adopt formal

orthographic markers like diacritics due to greater access to education (Walters, 2017; Smith, 2016). In contrast, rural regions, such as Gorontalo Utara and Pohuwato, tend to favor simpler methods like digraphs or single graphemes, reflecting limited educational resources and exposure to formal linguistic practices (Jones & Clark, 2015). These regional disparities highlight the need for targeted educational interventions to promote consistent orthographic practices across Gorontalo (Baker, 2011; Anderson, 2015).

2.8 Educational Implications of Orthographic Inconsistency

The inconsistencies in orthographic practices have significant implications for education in Gorontalo. In regions with well-developed educational infrastructure, speakers are more likely to use formalized orthographic systems, including diacritics and digraphs (Walters, 2017; Anderson, 2015). However, in rural areas with less access to education, simpler forms like single graphemes dominate, making language learning more difficult and reducing phonological clarity (Jones & Clark, 2015). Research has shown that providing consistent orthographic instruction can significantly improve literacy rates and enhance language preservation efforts in minority communities (Fishman, 2001; Anderson, 2015).

2.9 Orthographic Standardization and Language Preservation

Orthographic standardization is essential for preserving endangered languages like Gorontalo. Without a unified writing system, the language risks further fragmentation, which could lead to a loss of cultural and linguistic identity (Jones, 2012; Walters, 2017). Studies on language preservation have emphasized the importance of consistent orthographic practices in maintaining linguistic continuity and facilitating language transmission to future generations (Hinton & Hale, 2001; Anderson, 2015). In Gorontalo, standardizing the representation of long vowels, while accounting for regional and sociocultural differences, is a critical step toward ensuring the survival of the language (Smith & Walsh, 2018; Fishman, 2001).

The orthographic inconsistencies in the representation of long vowels in Gorontalo present significant challenges for language preservation. Regional, educational, and sociocultural factors all contribute to variability in orthographic practices, complicating efforts to create a standardized writing system. Standardizing the representation of long

vowels is essential for ensuring the continued survival and vitality of the Gorontalo language. Efforts to promote formalized orthographic instruction and incorporate traditional writing systems, such as Arabic Pegon, into cultural preservation initiatives are crucial steps toward this goal (Yusuf, 2012; Anderson, 2015).

3. Methodology

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3.1 Research Design

This study uses a descriptive corpus-based approach to analyze orthographic inconsistencies in the Gorontalo language. The corpus method allows for the objective analysis of linguistic data collected from real-world contexts (Coulmas, 2003; Anderson, 2015). This design is suitable for capturing linguistic variations, particularly in long vowel representation, across different sociocultural and regional contexts. By incorporating both quantitative and qualitative analyses, the study provides a comprehensive overview of how long vowels are represented, and the factors that influence orthographic choices (Walters, 2017; Fishman, 2001).

A cross-sectional survey was conducted to collect data from native Gorontalo speakers across six regions. This approach provides a snapshot of current orthographic practices, facilitating the exploration of regional variations in the use of diacritics, digraphs, and single graphemes (Jones & Clark, 2015; Rogers, 2005).

3.2 Respondents

The respondents were selected through purposive sampling to ensure the inclusion of a diverse range of native Gorontalo speakers, particularly those from different educational and regional backgrounds. A total of 213 respondents from six regions—Kota Gorontalo, Kabupaten Gorontalo, Bone Bolango, Gorontalo Utara, Pohuwato, and Boalemo—were chosen for the study. This sample captures a mix of urban and rural areas, allowing for the exploration of both traditional and modern orthographic practices (Jones & Foster, 2011; Anderson, 2015).

The distribution of respondents reflects the linguistic diversity of Gorontalo-speaking communities. This diverse sample ensures that the study can account for how access to education, regional sociocultural contexts, and exposure to formal writing systems influence orthographic tendencies (Fishman, 2001; Anderson, 2005).

3.3 Instruments

The study used a combination of questionnaires, interviews, and focus group discussions (FGD) to collect data. The primary instrument was a structured questionnaire designed to gather information on how respondents represent long vowels in writing. This instrument focused on four key orthographic practices:

1. Diacritics (colon and macron): Questions focused on the frequency of using a colon (u:) and macron (ū) to mark long vowels.
2. Digraphs (aa, uu): Respondents were asked about their use of vowel digraphs.
3. Single graphemes (a, u): Questions explored whether single graphemes are used without any markers to denote vowel length.
4. Arabic Pegon script: Questions regarding the use of this traditional script in modern contexts were included to examine its sociocultural significance (Daniels, 2010; Yusuf, 2009).

To gain deeper insights and validate the trends found in the questionnaires, interviews were conducted with representative respondents from each region. These interviews aimed to clarify the respondents' reasoning for choosing specific orthographic forms and to gather their views on language preservation. Additionally, Focus Group Discussions (FGD) were held with select respondents to further discuss the factors influencing orthographic choices, their perceptions of Gorontalo's written language, and the role of orthography in language preservation (Smith, 2016; Hinton & Hale, 2001).

3.4 Data Collection

Data collection occurred over a two-month period between June and August 2024, using both in-person and online distribution methods. In urban areas such as Kota Gorontalo, respondents completed the questionnaires electronically via google form, while in rural areas, the data were collected in person with the help of local community leaders (Walters, 2017; Smith, 2016). This mixed-method approach ensured a broad reach and allowed for the inclusion of respondents from regions

with limited internet access, such as Pohuwato and Boalemo (Jones, 2012).

A pre-test of the questionnaire was conducted with 10 participants to ensure the instrument's clarity and reliability. Based on feedback from this pilot test, minor adjustments were made to the questionnaire before full-scale data collection. Ethical considerations were observed throughout the study, including obtaining informed consent from all participants and maintaining their anonymity (Fishman, 2001; Anderson, 2015).

3.5 Data Analysis

The collected data were analyzed using both quantitative and qualitative methods to comprehensively understand the orthographic tendencies and the sociocultural factors influencing them.

1. Quantitative Analysis:
    a. Data Coding: Responses from the questionnaires were numerically coded based on the frequency and type of orthographic practices used (e.g., diacritics, digraphs, single graphemes). This allowed for statistical analysis of the frequency and regional distribution of each orthographic form (Walters, 2017; Anderson, 2005).
    b. Descriptive Statistics: Frequencies and percentages were calculated for each orthographic feature across the six regions. This provided insights into how specific markers are used and highlighted the patterns of orthographic usage (Coulmas, 2003; Jones & Clark, 2015).
    c. Cross-tabulation: Cross-tabulation was performed to identify relationships between demographic factors (e.g., educational background, age, region) and orthographic practices. This analysis helped uncover correlations between the use of certain orthographic markers and the sociocultural context (Walters, 2017; Anderson, 2015).
2. Qualitative Analysis:
    Interviews and FGD: Data from interviews and FGDs were transcribed and analyzed thematically. The qualitative data provided deeper insights into the reasons behind orthographic choices and the sociocultural significance of these practices. This analysis helped uncover the motivations behind using certain markers, as well as respondents' views on the preservation of the Gorontalo language

through orthographic consistency (Jones, 2012; Yusuf, 2009).

3.6 Ethical Considerations

The study adhered to ethical guidelines to protect the rights and privacy of participants. All respondents were informed about the purpose of the research and their role in it. Informed consent was obtained before participation, and anonymity was ensured by not collecting any identifying information beyond basic demographic data (Smith, 2016; Fishman, 2001). Participants were also given the option to withdraw from the study at any time, without consequence, in line with ethical best practices in social science research (Anderson, 2015).

The methodology employed in this study provides a comprehensive framework for understanding the orthographic inconsistencies in long vowel representation in Gorontalo. By combining corpus analysis with quantitative and qualitative research methods, this study captures both the frequency of different orthographic forms and the sociocultural factors influencing their usage. The insights gained from this research will contribute to efforts toward orthographic standardization and language preservation, ensuring that the Gorontalo language is transmitted effectively to future generations (Walters, 2017; Anderson, 2015).

4. Results

4.1 Usage of Colon Diacritic

This study investigated the distribution of long vowel usage represented with a colon diacritic (u:) across different regions of Gorontalo. Table 1 shows the number of respondents who use colon diacritic to mark long vowels in six regions, alongside the total number of respondents in each region.

Table 1. Distribution of Long Vowel Representation Using Colon Diacritic by Region

Region	Respondents Using Colon Diacritic	Total Respondents	Percentage (%)
Kota Gorontalo	8	70	11.43%
Kabupaten Gorontalo	2	34	5.88%
Bone Bolango	3	28	10.71%
Gorontalo	2	23	8.70%

Region	Respondents Using Colon Diacritic	Total Respondents	Percentage (%)
Utara			
Pohuwato	2	25	8.00%
Boalemo	4	33	12.12%

1. Overall Trends

The results indicate that the use of colon diacritic (u:) for long vowel representation is relatively low across the surveyed regions, with an average usage rate below 12.5%. Boalemo has the highest percentage of respondents using the diacritic at 12.12%, followed closely by Kota Gorontalo with 11.43%. On the other hand, Kabupaten Gorontalo reported the lowest usage, with only 5.88% of respondents utilizing this orthographic marker.

2. Variation Between Regions

a. Kota Gorontalo, being one of the most urbanized regions, shows a higher adoption of colon diacritic use compared to more rural areas like Kabupaten Gorontalo and Pohuwato. This suggests that respondents in urban areas may have better exposure to or understanding of formal orthographic conventions.
b. Boalemo stands out with the highest adoption rate (12.12%), which could indicate a localized orthographic preference or influence from educational or cultural practices specific to the region.
c. Bone Bolango also shows relatively higher usage (10.71%) compared to other regions, although still below the national average of long vowel usage with diacritics.

3. Regions with Lower Usage

Regions such as Kabupaten Gorontalo and Pohuwato show the least adoption of colon diacritics, with percentages of 5.88% and 8.00% respectively. These low figures may indicate a lack of standard orthographic education or preference for simpler forms of long vowel representation, such as digraphs or unmarked vowels.

4. Implications

The findings reveal that while the colon diacritic is used to some extent in

Gorontalo, it has not yet become a widely accepted standard across all regions. This may be due to varying levels of orthographic awareness or educational access in different regions. The higher usage in Boalemo and Kota Gorontalo suggests that regional factors—such as access to formal education or urbanization—may influence the adoption of formal orthographic practices.

4.2 Usage of Macron Diacritic

This section extends the investigation into the use of macron diacritic (ū) for marking long vowels in several regions of Gorontalo. Table 2 displays the number of respondents who use the macron diacritic for long vowel representation, alongside the total number of respondents in each region.

Table 2. Distribution of Long Vowel Representation Using Macron Diacritic by Region

Region	Respondents Using Macron Diacritic	Total Respondents	Percentage (%)
Kota Gorontalo	0	70	0.00%
Kabupaten Gorontalo	1	34	2.94%
Bone Bolango	0	28	0.00%
Gorontalo Utara	0	23	0.00%
Pohuwato	0	25	0.00%
Boalemo	0	33	0.00%

1. Overall Trends

The results show very low adoption of the macron diacritic for long vowel representation. Out of all the regions surveyed, only Kabupaten Gorontalo reported any use of the macron diacritic, with just 1 respondent (2.94%) utilizing it. In all other regions, no respondents reported using this diacritic.

2. Variation Between Regions

a. Kota Gorontalo, Bone Bolango, Gorontalo Utara, Pohuwato, and Boalemo reported 0% usage of the macron diacritic. This indicates that the use of this diacritic is not widespread and may not be part of the accepted orthographic conventions in these

regions.

b. Kabupaten Gorontalo stands out as the only region where the macron diacritic was reported, albeit by a very small percentage of respondents (2.94%). This suggests that there may be limited localized knowledge or experimentation with the use of macrons in this region.

3. Implications

The near-complete absence of the macron diacritic in long vowel representation suggests that this diacritic has not been integrated into the orthographic practices of the majority of Gorontalo's population. The lack of usage across most regions may reflect either a lack of awareness of the macron diacritic or a preference for other methods of long vowel representation, such as digraphs or colon diacritic (u:). The isolated use in Kabupaten Gorontalo may indicate early attempts to adopt more formal orthographic conventions, but this has not yet spread to the wider population.

4. Educational and Cultural Considerations

The limited use of the macron diacritic highlights a potential gap in orthographic standardization and education regarding formal diacritical marks in Gorontalo. In regions where macron usage is virtually non-existent, efforts to raise awareness or formalize such conventions could be beneficial, particularly in academic or formal settings where precise phonological representation is required. However, the general preference for simpler writing forms without diacritic markers might also indicate cultural preferences for less complex orthographic systems.

4.3 Usage of Single Grapheme

This section provides findings on the usage of single grapheme to represent long vowels across the surveyed regions in Gorontalo. Table 3 outlines the number of respondents who utilize single graphemes (e.g., "u" or "a" without diacritics or digraphs) for long vowel representation.

Table 3. Distribution of Long Vowel Representation Using Single Grapheme by Region

Region	Respondents Using Single Grapheme	Total Respondents	Percentage (%)

Region	Respondents Using Single Grapheme	Total Respondents	Percentage (%)
Kota Gorontalo	15	70	21.43%
Kabupaten Gorontalo	14	34	41.18%
Bone Bolango	10	28	35.71%
Gorontalo Utara	11	23	47.83%
Pohuwato	9	25	36.00%
Boalemo	14	33	42.42%

1. Overall Trends

The results indicate a moderate to high adoption of the single grapheme method to represent long vowels across the surveyed regions. Gorontalo Utara shows the highest usage rate, with 47.83% of respondents using single graphemes, followed closely by Boalemo (42.42%) and Kabupaten Gorontalo (41.18%). Kota Gorontalo has the lowest adoption rate, with 21.43% of respondents using single graphemes.

2. Variation Between Regions

a. Gorontalo Utara has the highest proportion of respondents using single graphemes (47.83%), indicating a strong preference for this method in the region. This suggests that the orthographic tradition here may prioritize simpler representations without the use of diacritics or digraphs.
b. Boalemo and Kabupaten Gorontalo both show similar trends with over 40% of respondents adopting single grapheme usage, suggesting that the simplification of vowel representation is prevalent in these regions.
c. Kota Gorontalo, the most urbanized region, has the lowest usage rate (21.43%), which may indicate a higher awareness or preference for using more complex orthographic systems like diacritics or digraphs to represent long vowels.

3. Implications

The data show that single grapheme representation is quite common, with several regions reporting adoption rates exceeding 40%. This suggests a general preference for minimalist orthographic systems in certain regions of Gorontalo, where long vowels are represented with a single grapheme

rather than with diacritics or digraphs.
This trend could be influenced by the informality of spoken and written language in rural regions, where complex orthographic systems might not be widely taught or used. On the other hand, in Kota Gorontalo, where the usage rate is the lowest, respondents may have access to more formalized education that encourages the use of digraphs or diacritics.

4. Educational and Cultural Factors
The widespread use of single grapheme representation suggests that there is a cultural and educational preference for simpler writing forms in many regions. This could be driven by practical reasons, such as the ease of use in informal communication and the limited need for formalized vowel marking in daily language use.
However, in regions like Kota Gorontalo, where usage of single graphemes is lower, it is possible that more standardized orthographic conventions are being promoted, particularly in academic or formal writing settings. This difference between regions may reflect varying levels of education and exposure to formalized orthographic practices.

4.4 Usage of Diagraphs

This section examines the usage of digraphs (such as "aa" or "uu") for long vowel representation in different regions of Gorontalo. Table 4 displays the number of respondents who utilize digraphs to represent long vowels, alongside the total number of respondents and their percentage within each region.

Table 4. Distribution of Long Vowel Representation Using Digraph by Region

Region	Respondents Using Digraph	Total Respondents	Percentage (%)
Kota Gorontalo	45	70	64.29%
Kabupaten Gorontalo	17	34	50.00%
Bone Bolango	15	28	53.57%
Gorontalo Utara	10	23	43.48%
Pohuwato	14	25	56.00%
Boalemo	15	33	45.45%

1. Overall Trends
The results show that the use of digraphs is quite prevalent across all

regions surveyed, with Kota Gorontalo showing the highest adoption rate at 64.29%. The overall range of usage falls between 43.48% (Gorontalo Utara) and 64.29% (Kota Gorontalo), indicating a fairly high adoption rate across regions.

2. Variation Between Regions

a. Kota Gorontalo reports the highest usage of digraphs (64.29%), suggesting a strong preference for digraph-based representation of long vowels. This could be attributed to urbanization and higher levels of formal education that promote standard orthographic practices.
b. Pohuwato and Bone Bolango follow with significant percentages of 56.00% and 53.57% respectively, showing that digraphs are a popular method of long vowel representation in these regions as well.
c. Kabupaten Gorontalo and Boalemo also show relatively high usage, with 50.00% and 45.45% of respondents respectively using digraphs. These figures are close to the regional average.
d. Gorontalo Utara, with 43.48%, has the lowest percentage of respondents using digraphs. However, this is still a substantial proportion, indicating that digraphs are fairly common even in this region.

3. Implications

The high percentage of digraph use across regions suggests that digraphs are a well-established method of representing long vowels in Gorontalo. This reflects a widespread orthographic convention that aligns with formal writing practices in both urban and rural areas. Digraphs are particularly effective in simplifying vowel length representation without relying on diacritics or more complex orthographic markers, making them accessible and easy to use for both formal and informal communication.

4. Educational and Cultural Considerations

The widespread adoption of digraphs indicates that this method is likely well-accepted in educational contexts and may be reinforced through school curricula. The consistent use of digraphs across different regions reflects a degree of standardization that could be further reinforced through formal education and language documentation efforts.

However, there may still be regional differences in the understanding or adoption of formalized writing systems, particularly in regions like Gorontalo Utara and Boalemo, where the usage of digraphs is lower compared to Kota Gorontalo. Targeted educational programs focusing on orthographic consistency may be beneficial in these regions to promote a more uniform approach to vowel representation.

4.5 Usage of Arabic Pegon Script

This section presents findings on the usage of Arabic Pegon script for writing in various regions of Gorontalo. Table 5 illustrates the number of respondents who reported using the Arabic Pegon script, alongside the total number of respondents and their percentage in each region.

Table 5. Distribution of Arabic Pegon Script Usage by Region

Region	Respondents Using Arabic Pegon Script	Total Respondents	Percentage (%)
Kota Gorontalo	2	70	2.86%
Kabupaten Gorontalo	0	34	0.00%
Bone Bolango	0	28	0.00%
Gorontalo Utara	0	23	0.00%
Pohuwato	0	25	0.00%
Boalemo	0	33	0.00%

1. Overall Trends

The data shows very low usage of the Arabic Pegon script for writing across all regions surveyed. The only region where any usage is reported is Kota Gorontalo, with 2 respondents (2.86%). In all other regions—Kabupaten Gorontalo, Bone Bolango, Gorontalo Utara, Pohuwato, and Boalemo—there are 0% respondents who use the Arabic Pegon script.

2. Variation Between Regions

a. Kota Gorontalo stands out as the only region where the Arabic Pegon script is used at all, with a very small percentage of 2.86% of respondents. This likely reflects the urban nature of Kota Gorontalo, where respondents may have more exposure to different writing systems, including traditional ones like Arabic Pegon.

b. In all other regions, no respondents reported using the Arabic Pegon script, indicating that it is not a prevalent form of writing in Kabupaten Gorontalo, Bone Bolango, Gorontalo Utara, Pohuwato, or Boalemo. This suggests that either the script is not widely known or that it has fallen out of general use in these regions.

3. Implications

The low usage of Arabic Pegon script across all surveyed regions implies that this traditional script may no longer be in active use for writing in Gorontalo, especially outside Kota Gorontalo. Even in Kota Gorontalo, where 2 respondents reported using the script, the adoption rate remains extremely low (2.86%).

The limited use of Arabic Pegon could reflect a shift towards Latin-based writing systems, which are more commonly used in both formal education and daily communication. This trend away from Arabic Pegon may indicate the decline of traditional writing systems, which were historically significant but may now be restricted to niche or ceremonial use.

4. Educational and Cultural Considerations

The decline in the use of Arabic Pegon script highlights the need for cultural preservation efforts if there is a desire to maintain knowledge of this traditional script. Educational initiatives that reintroduce Arabic Pegon in cultural studies or heritage education could help revitalize interest in this script, especially in urban areas like Kota Gorontalo where there is still some familiarity with it.

Additionally, documentation efforts may be necessary to ensure that the knowledge of Arabic Pegon does not disappear entirely. Programs that combine language preservation with cultural heritage such as me'eraji manuscript could be beneficial in retaining the historical significance of this script in the Gorontalo region for Arab Pegon as the second orthography in Gorontalo writing system.

5. Discussion

The results presented in the previous section highlight significant variation in the orthographic practices of vowel length representation and the usage of Arabic Pegon script in Gorontalo. This discussion delves into these findings, analyzing the implications of different methods of

vowel representation—diacritic colon (u:), macron (ū), digraphs, and single grapheme—as well as the usage of Arabic Pegon script. Each method's impact on linguistic standardization, cultural preservation, and educational practices is examined in detail.

5.1 Usage of Diacritics (Colon and Macron)

The findings indicate that the use of diacritic colon (u:) for long vowel representation is relatively low across Gorontalo, with the highest adoption rate in Boalemo (12.12%) and the lowest in Kabupaten Gorontalo (5.88%). Similarly, the use of macron (ū) is almost non-existent, with Kabupaten Gorontalo being the only region where its usage was recorded (2.94%). This indicates a general lack of awareness or preference for these formalized orthographic markers among the population.

The limited use of diacritics might be attributed to pedagogical limitations or the fact that most speakers rely on contextual cues in spoken language rather than written markers to distinguish between long and short vowels (Jones, 2012). While diacritics offer precision in marking phonological distinctions, their limited adoption in Gorontalo suggests that there is insufficient emphasis on formal orthographic education at the local level (Anderson, 2005). Additionally, digital communication tools that do not easily support the use of diacritics might further discourage their use, particularly among younger generations (Smith, 2016).

5.2 Preference for Digraphs

In contrast to diacritics, the use of digraphs (e.g., "aa" or "uu") is far more common, with Kota Gorontalo showing the highest adoption (64.29%) and Gorontalo Utara the lowest (43.48%). This widespread preference suggests that digraphs provide a simpler and more accessible solution for indicating vowel length, as they do not require specialized characters and are supported across all platforms (Walters, 2017).

The popularity of digraphs across regions may be linked to their use in informal communication and local educational practices. Given that digraphs are easier to implement in both digital and handwritten formats, they serve as a practical compromise between phonological accuracy and ease of use. However, the reliance on digraphs could contribute to regional orthographic variability, especially in areas with lower educational resources (Jones & Foster, 2011). To achieve linguistic

standardization, educational efforts must focus on promoting consistent usage of digraphs while also introducing more formalized writing conventions in appropriate contexts.

5.3 Use of Single Grapheme

The adoption of single grapheme to represent long vowels without diacritic markers is also prevalent, particularly in Gorontalo Utara (47.83%) and Boalemo (42.42%). This trend reflects a preference for simplified orthographic practices in certain regions, where the phonological length of vowels is understood through context rather than explicit markers.

The use of single grapheme without diacritics aligns with findings in other low-resource language communities, where simplicity and ease of writing often take precedence over phonological precision (Brown, 2014). However, this practice can result in ambiguous interpretations of written language, particularly for non-native speakers or learners who are not familiar with the spoken language's nuances (Jones & Clark, 2015). Therefore, while single grapheme usage may be convenient for native speakers, it complicates language teaching and could hinder efforts to standardize the writing system across different dialects and regions (Smith & Walsh, 2018).

5.4 The Use of Arabic Pegon Script

The findings indicate that the use of Arabic Pegon script is largely absent across Gorontalo, with only 2 respondents in Kota Gorontalo (2.86%) reporting its use. This aligns with the general trend across Indonesia, where the Latin script has become dominant, relegating traditional scripts like Pegon to ceremonial or religious contexts (Yusuf, 2009).

The near-extinction of Pegon in writing suggests that cultural shifts and the introduction of formal education systems based on Latin script have contributed to the diminishing role of traditional scripts (Harris, 2013). Furthermore, the lack of Pegon usage highlights a broader cultural and linguistic displacement, as younger generations are less likely to learn or use the script (Anderson, 2015). Given the rich history of Pegon in the transmission of Islamic knowledge in Indonesia, its near-disappearance in Gorontalo raises questions about the future of cultural literacy and the preservation of traditional writing systems (Yusuf, 2012).

Efforts to revitalize Arabic Pegon in Gorontalo should consider targeted cultural preservation programs that integrate Pegon into religious

education and local heritage initiatives (Anderson, 2015). This could help maintain its significance as a marker of cultural identity, even if its practical use in everyday writing continues to decline.

6. Conclusion

The results highlight a clear preference for digraphs over more formalized methods of vowel representation, such as diacritics or macron, and the limited use of Arabic Pegon suggests a significant shift towards Latin-based scripts. This suggests that while practical and accessible orthographic practices dominate everyday usage, they may hinder linguistic standardization and phonological accuracy. The findings call for targeted educational programs to promote consistent orthographic conventions, while also recognizing the role of cultural preservation efforts in maintaining traditional writing systems like Pegon.

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2. Initial Pre-Review Evaluation (15 November 2024)

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Submission - Review Requested - WorkID: 105334

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Kepada: s_bouti@ung.ac.id

Dear Suleman Bouti,

Thank you for your recent submission. Your manuscript has been reviewed by our editorial team, and it has been desk rejected from The International Journal of Interdisciplinary Cultural Studies. However, it has been recommended for consideration in The International Journal of Communication and Linguistic Studies, pending your approval and some revisions as noted below.

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3. **Submission of Revised Manuscript (28 November 2024)**

Orthographic Inconsistencies in Long Vowel Representation in Gorontalo: A Linguistic and Sociocultural Analysis for Language Preservation

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Abstract

This study investigates the orthographic inconsistencies in the representation of long vowels in the Gorontalo language, focusing on the use of diacritics, digraphs, single graphemes, and the traditional Arabic Pegon script. The inconsistencies present challenges for language preservation, documentation, and standardization efforts. A mixed-methods approach was employed, involving 213 respondents from six regions in Gorontalo. Data were collected through questionnaires, interviews, and focus group discussions. The analysis focused on how different orthographic forms are utilized and the sociocultural factors that influence these practices. The findings reveal significant variations in long vowel representation across regions. Digraphs are the most commonly used method, while diacritics and the Arabic Pegon script are rarely adopted. The study highlights how education levels and sociocultural shifts influence these orthographic preferences, leading to regional differences and challenges in achieving orthographic standardization. The study concludes that while digraphs are prevalent, the lack of a unified system for representing long vowels in Gorontalo complicates language preservation efforts. Standardization and educational programs are necessary to promote consistent orthographic practices, particularly for future language documentation and preservation.

Keywords: Orthography, long vowels, Gorontalo, language preservation, digraphs, diacritics.

1. Introduction

Orthography plays a pivotal role in language preservation, especially for endangered languages, as it provides a standardized method of representing the sounds and structure of a language. In the case of the Gorontalo language, spoken predominantly in the Gorontalo province of Indonesia, inconsistencies in the representation of long vowels present significant challenges for language documentation, education, and transmission to future generations (Anderson, 2015; Coulmas, 2003). These challenges are exacerbated by regional variations in the use of diacritics, digraphs, and single graphemes, all of which contribute to difficulties in achieving a unified writing system for the language (Walters, 2017).

Long vowels, which can differentiate meaning in Gorontalo, are represented inconsistently across different regions. Diacritics such as the colon (u:) or macron (ū) are used in some areas, while others rely on simpler digraphs (aa, uu) or even single graphemes (a, u) (Smith, 2016; Sebba, 2007). This variability complicates communication and threatens the phonological integrity of the language, making it difficult for speakers to adopt a standardized orthography that can be universally taught and utilized (Jones & Clark, 2015). Without a consistent system for representing long vowels, Gorontalo risks further fragmentation in its written form, which could lead to a loss of linguistic and cultural identity over time (Walters, 2017; Fishman, 2001).

The use of diacritics in writing systems worldwide, including in Gorontalo, serves to clarify phonological distinctions, but their adoption is often hindered by a lack of formal education or technical limitations (Daniels, 2010; Coulmas, 2003). For instance, in urban areas like Kota Gorontalo, there is a higher tendency to use diacritics, whereas rural regions like Pohuwato and Boalemo tend to prefer simpler methods such as digraphs or unmarked vowels (Walters, 2017). Studies suggest that educational access and exposure to formal linguistic practices significantly influence the adoption of more complex orthographic systems (Anderson, 2015; Baker, 2011).

Digraphs, which involve the doubling of vowel letters to indicate length (e.g., aa or uu), offer a simpler and more accessible method for representing long vowels and are widely used in many languages with shallow orthographies (Rogers, 2005; Simpson, 2006). In Gorontalo, digraphs are especially prevalent in regions with limited formal education, where the use of diacritics may be impractical due to technological

constraints or a lack of familiarity (Walters, 2017). While digraphs provide a straightforward solution, their use contributes to regional variability in orthographic practices, which poses a barrier to standardization (Smith & Walsh, 2018).

Sociocultural factors also play a crucial role in shaping orthographic conventions in Gorontalo. Traditional scripts such as Arabic Pegon, once used widely in religious and cultural contexts, have largely fallen out of use, replaced by Latin-based scripts except in specific ceremonial settings (Yusuf, 2009; Anderson, 2015). This transition reflects broader cultural shifts driven by globalization and modern education systems, where the practical use of traditional scripts has diminished (Harris, 2013). The decline in the use of Arabic Pegon raises concerns about the loss of cultural heritage and highlights the need for balancing modern linguistic practices with efforts to preserve traditional writing systems (Errington, 1998; Sneddon, 2003).

The inconsistencies in orthographic practices not only affect language standardization but also have significant implications for education. In regions with more developed educational infrastructures, speakers are more likely to adopt formalized orthographic markers such as diacritics, while in rural areas, simpler forms such as digraphs or single graphemes dominate (Jones & Clark, 2015; Anderson, 2015). This divide underscores the need for educational interventions aimed at promoting consistent orthographic practices across all regions of Gorontalo to support both language preservation and effective communication (Walters, 2017).

Standardizing the orthographic representation of long vowels is essential for ensuring the survival of the Gorontalo language and preserving its phonological integrity. The development of a unified writing system that accounts for regional and sociocultural differences is crucial for maintaining linguistic continuity while also adapting to the modern educational and technological landscape (Smith, 2016; Walters, 2017). By addressing these orthographic inconsistencies, Gorontalo can enhance its language preservation efforts and foster a greater sense of cultural identity.

2. Literature Review

2.1 Orthographic Inconsistencies in Long Vowel Representation

Orthographic consistency is crucial for language preservation, especially in endangered languages like Gorontalo. In the case of Gorontalo, the

representation of long vowels has been inconsistent, with various methods employed across different regions. These methods include the use of diacritics, such as the colon (u:) and macron (ū), as well as digraphs (aa, uu), and single graphemes. This inconsistency complicates efforts to preserve the language and maintain its phonological accuracy (Coulmas, 2003; Walters, 2017). The lack of a unified orthography threatens both the language's phonological integrity and cultural heritage, highlighting the importance of developing a consistent system (Anderson, 2015; Smith & Walsh, 2018).

2.2 Linguistic Importance of Long Vowel Representation

Vowel length is a significant phonological feature in many languages, including Gorontalo, where it plays a crucial role in distinguishing word meanings and syntactical structures. Inconsistent representation of long vowels across regions results in communication barriers, affecting both the local population and broader educational contexts. Orthographic practices that fail to accurately represent vowel length can hinder language preservation efforts, as written forms are essential for documentation and transmission (Walters, 2017; Jones & Clark, 2015). Research shows that standardizing orthography is necessary to ensure languages like Gorontalo remain accessible to speakers and learners alike (Anderson, 2015; Spencer, 1997).

2.3 Diacritics: Theoretical Perspectives and Practical Challenges

Diacritics are essential in many writing systems for marking phonological distinctions, such as vowel length. In the case of Gorontalo, diacritics like the colon (u:) and macron (ū) are used by some speakers, particularly in urban areas, but remain uncommon in rural regions (Smith, 2016; Anderson, 2015). Although diacritics provide phonological precision, their adoption in Gorontalo has been limited, largely due to factors like lack of formal education and the challenges of using these symbols in digital communication (Daniels, 2010; Coulmas, 2003). Studies suggest that promoting the use of diacritics could enhance language precision, but widespread adoption is hindered by technological and educational barriers (Sebba, 2007; Walters, 2017).

2.4 Digraphs: A Simpler Alternative

In contrast to diacritics, digraphs (e.g., aa, uu) offer a simpler method for representing long vowels and are widely used in languages with shallow

orthographies (Simpson, 2006; Rogers, 2005). In Gorontalo, digraphs are particularly common in rural regions, where they are favored for their simplicity and ease of use (Walters, 2017; Brown, 2014). The use of digraphs reflects broader trends in low-resource languages, where practical considerations often take precedence over linguistic accuracy. However, the reliance on digraphs also contributes to regional orthographic variability, which complicates efforts to achieve standardization (Smith & Walsh, 2018; Nettle & Romaine, 2000).

2.5 Single Graphemes and Simplified Orthographies

In many regions of Gorontalo, particularly rural areas like Pohuwato and Boalemo, speakers often use single graphemes (e.g., a, u) to represent long vowels, foregoing diacritics and digraphs altogether (Jones & Foster, 2011; Anderson, 2005). This practice is common in informal writing and reflects the simplicity and practicality preferred by many speakers. However, the use of single graphemes can lead to ambiguity, especially for non-native speakers or learners unfamiliar with the nuances of spoken Gorontalo (Walters, 2017; Anderson, 2015). Simplified orthographies, while easier to use, pose challenges for language teaching and preservation, as they fail to capture important phonological distinctions (Brown, 2014; Spencer & Zwicky, 1998).

2.6 Sociocultural Influences on Orthographic Practices

The sociocultural context of Gorontalo significantly influences orthographic choices. Historically, the Arabic Pegon script was used in religious texts, but its usage has declined, with most speakers now relying on Latin-based orthographies (Yusuf, 2009; Anderson, 2015). The shift from traditional to modern orthographic systems reflects broader cultural changes, including globalization and the increasing influence of formal education (Errington, 1998; Harris, 2013). In contemporary Gorontalo, the use of traditional scripts like Pegon is limited to specific contexts, such as religious ceremonies, raising concerns about the loss of cultural heritage (Yusuf, 2012; Gauthier, 2010). Balancing the use of traditional and modern orthographies remains a challenge for language preservation.

2.7 Regional Variability in Orthographic Practices

Regional differences in educational access and cultural exposure contribute to variability in orthographic practices in Gorontalo. Urban regions, such as Kota Gorontalo, are more likely to adopt formal

orthographic markers like diacritics due to greater access to education (Walters, 2017; Smith, 2016). In contrast, rural regions, such as Gorontalo Utara and Pohuwato, tend to favor simpler methods like digraphs or single graphemes, reflecting limited educational resources and exposure to formal linguistic practices (Jones & Clark, 2015). These regional disparities highlight the need for targeted educational interventions to promote consistent orthographic practices across Gorontalo (Baker, 2011; Anderson, 2015).

2.8 Educational Implications of Orthographic Inconsistency

The inconsistencies in orthographic practices have significant implications for education in Gorontalo. In regions with well-developed educational infrastructure, speakers are more likely to use formalized orthographic systems, including diacritics and digraphs (Walters, 2017; Anderson, 2015). However, in rural areas with less access to education, simpler forms like single graphemes dominate, making language learning more difficult and reducing phonological clarity (Jones & Clark, 2015). Research has shown that providing consistent orthographic instruction can significantly improve literacy rates and enhance language preservation efforts in minority communities (Fishman, 2001; Anderson, 2015).

2.9 Orthographic Standardization and Language Preservation

Orthographic standardization is essential for preserving endangered languages like Gorontalo. Without a unified writing system, the language risks further fragmentation, which could lead to a loss of cultural and linguistic identity (Walters, 2017). Studies on language preservation have emphasized the importance of consistent orthographic practices in maintaining linguistic continuity and facilitating language transmission to future generations (Hinton & Hale, 2001; Anderson, 2015). In Gorontalo, standardizing the representation of long vowels, while accounting for regional and sociocultural differences, is a critical step toward ensuring the survival of the language (Smith & Walsh, 2018; Fishman, 2001).

The orthographic inconsistencies in the representation of long vowels in Gorontalo present significant challenges for language preservation. Regional, educational, and sociocultural factors all contribute to variability in orthographic practices, complicating efforts to create a standardized writing system. Standardizing the representation of long vowels is essential for ensuring the continued survival and vitality of the

Gorontalo language. Efforts to promote formalized orthographic instruction and incorporate traditional writing systems, such as Arabic Pegon, into cultural preservation initiatives are crucial steps toward this goal (Yusuf, 2012; Anderson, 2015).

3. Methodology

Figures, maps and tables should be in the format given in Table 1 and Figure 1. Table captions should be placed above the table. Captions of figures, maps or pictures should be placed below. Please leave a blank line before and after the tables/figures/maps/pictures. If there are any Chinese characters in them, please convert to traditional characters.

3.1 Research Design

This study uses a descriptive corpus-based approach to analyze orthographic inconsistencies in the Gorontalo language. The corpus method allows for the objective analysis of linguistic data collected from real-world contexts (Coulmas, 2003; Anderson, 2015). This design is suitable for capturing linguistic variations, particularly in long vowel representation, across different sociocultural and regional contexts. By incorporating both quantitative and qualitative analyses, the study provides a comprehensive overview of how long vowels are represented, and the factors that influence orthographic choices (Walters, 2017; Fishman, 2001).

A cross-sectional survey was conducted to collect data from native Gorontalo speakers across six regions. This approach provides a snapshot of current orthographic practices, facilitating the exploration of regional variations in the use of diacritics, digraphs, and single graphemes (Jones & Clark, 2015; Rogers, 2005).

3.2 Respondents

The respondents were selected through purposive sampling to ensure the inclusion of a diverse range of native Gorontalo speakers, particularly those from different educational and regional backgrounds. A total of 213 respondents from six regions—Kota Gorontalo, Kabupaten Gorontalo, Bone Bolango, Gorontalo Utara, Pohuwato, and Boalemo—were chosen for the study. This sample captures a mix of urban and rural areas, allowing for the exploration of both traditional and modern orthographic practices (Jones & Foster, 2011; Anderson, 2015).

The distribution of respondents reflects the linguistic diversity of

Gorontalo-speaking communities. This diverse sample ensures that the study can account for how access to education, regional sociocultural contexts, and exposure to formal writing systems influence orthographic tendencies (Fishman, 2001; Anderson, 2005).

3.3 Instruments

The study used a combination of questionnaires, interviews, and focus group discussions (FGD) to collect data. The primary instrument was a structured questionnaire designed to gather information on how respondents represent long vowels in writing. This instrument focused on four key orthographic practices:

1. Diacritics (colon and macron): Questions focused on the frequency of using a colon (u:) and macron (ū) to mark long vowels.
2. Digraphs (aa, uu): Respondents were asked about their use of vowel digraphs.
3. Single graphemes (a, u): Questions explored whether single graphemes are used without any markers to denote vowel length.
4. Arabic Pegon script: Questions regarding the use of this traditional script in modern contexts were included to examine its sociocultural significance (Daniels, 2010; Yusuf, 2009).

To gain deeper insights and validate the trends found in the questionnaires, interviews were conducted with representative respondents from each region. These interviews aimed to clarify the respondents' reasoning for choosing specific orthographic forms and to gather their views on language preservation. Additionally, Focus Group Discussions (FGD) were held with select respondents to further discuss the factors influencing orthographic choices, their perceptions of Gorontalo's written language, and the role of orthography in language preservation (Smith, 2016; Hinton & Hale, 2001).

3.4 Data Collection

Data collection occurred over a two-month period between June and August 2024, using both in-person and online distribution methods. In urban areas such as Kota Gorontalo, respondents completed the questionnaires electronically via google form, while in rural areas, the data were collected in person with the help of local community leaders (Walters, 2017; Smith, 2016). This mixed-method approach ensured a broad reach and allowed for the inclusion of respondents from regions with limited internet access, such as Pohuwato and Boalemo.

A pre-test of the questionnaire was conducted with 10 participants to ensure the instrument's clarity and reliability. Based on feedback from this pilot test, minor adjustments were made to the questionnaire before full-scale data collection. Ethical considerations were observed throughout the study, including obtaining informed consent from all participants and maintaining their anonymity (Fishman, 2001; Anderson, 2015).

3.5 Data Analysis

The collected data were analyzed using both quantitative and qualitative methods to comprehensively understand the orthographic tendencies and the sociocultural factors influencing them.

1. Quantitative Analysis:
    a. Data Coding: Responses from the questionnaires were numerically coded based on the frequency and type of orthographic practices used (e.g., diacritics, digraphs, single graphemes). This allowed for statistical analysis of the frequency and regional distribution of each orthographic form (Walters, 2017; Anderson, 2005).
    b. Descriptive Statistics: Frequencies and percentages were calculated for each orthographic feature across the six regions. This provided insights into how specific markers are used and highlighted the patterns of orthographic usage (Coulmas, 2003; Jones & Clark, 2015).
    c. Cross-tabulation: Cross-tabulation was performed to identify relationships between demographic factors (e.g., educational background, age, region) and orthographic practices. This analysis helped uncover correlations between the use of certain orthographic markers and the sociocultural context (Walters, 2017; Anderson, 2015).
2. Qualitative Analysis:
    Interviews and FGD: Data from interviews and FGDs were transcribed and analyzed thematically. The qualitative data provided deeper insights into the reasons behind orthographic choices and the sociocultural significance of these practices. This analysis helped uncover the motivations behind using certain markers, as well as respondents' views on the preservation of the Gorontalo language through orthographic consistency (Yusuf, 2009).

3.6 Ethical Considerations

The study adhered to ethical guidelines to protect the rights and privacy of participants. All respondents were informed about the purpose of the research and their role in it. Informed consent was obtained before participation, and anonymity was ensured by not collecting any identifying information beyond basic demographic data (Smith, 2016; Fishman, 2001). Participants were also given the option to withdraw from the study at any time, without consequence, in line with ethical best practices in social science research (Anderson, 2015).

The methodology employed in this study provides a comprehensive framework for understanding the orthographic inconsistencies in long vowel representation in Gorontalo. By combining corpus analysis with quantitative and qualitative research methods, this study captures both the frequency of different orthographic forms and the sociocultural factors influencing their usage. The insights gained from this research will contribute to efforts toward orthographic standardization and language preservation, ensuring that the Gorontalo language is transmitted effectively to future generations (Walters, 2017; Anderson, 2015).

4. Results

4.1 Usage of Colon Diacritic

This study investigated the distribution of long vowel usage represented with a colon diacritic (u:) across different regions of Gorontalo. Table 1 shows the number of respondents who use colon diacritic to mark long vowels in six regions, alongside the total number of respondents in each region.

Table 1. Distribution of Long Vowel Representation Using Colon Diacritic by Region

Region	Respondents Using Colon Diacritic	Total Respondents	Percentage (%)
Kota Gorontalo	8	70	11.43%
Kabupaten Gorontalo	2	34	5.88%
Bone Bolango	3	28	10.71%
Gorontalo Utara	2	23	8.70%
Pohuwato	2	25	8.00%

Region	Respondents Using Colon Diacritic	Total Respondents	Percentage (%)
Boalemo	4	33	12.12%

1. Overall Trends

The results indicate that the use of colon diacritic (u:) for long vowel representation is relatively low across the surveyed regions, with an average usage rate below 12.5%. Boalemo has the highest percentage of respondents using the diacritic at 12.12%, followed closely by Kota Gorontalo with 11.43%. On the other hand, Kabupaten Gorontalo reported the lowest usage, with only 5.88% of respondents utilizing this orthographic marker.

2. Variation Between Regions

a. Kota Gorontalo, being one of the most urbanized regions, shows a higher adoption of colon diacritic use compared to more rural areas like Kabupaten Gorontalo and Pohuwato. This suggests that respondents in urban areas may have better exposure to or understanding of formal orthographic conventions.
b. Boalemo stands out with the highest adoption rate (12.12%), which could indicate a localized orthographic preference or influence from educational or cultural practices specific to the region.
c. Bone Bolango also shows relatively higher usage (10.71%) compared to other regions, although still below the national average of long vowel usage with diacritics.

3. Regions with Lower Usage

Regions such as Kabupaten Gorontalo and Pohuwato show the least adoption of colon diacritics, with percentages of 5.88% and 8.00% respectively. These low figures may indicate a lack of standard orthographic education or preference for simpler forms of long vowel representation, such as digraphs or unmarked vowels.

4. Implications

The findings reveal that while the colon diacritic is used to some extent in Gorontalo, it has not yet become a widely accepted standard across all regions. This may be due to varying levels of orthographic awareness or

educational access in different regions. The higher usage in Boalemo and Kota Gorontalo suggests that regional factors—such as access to formal education or urbanization—may influence the adoption of formal orthographic practices.

4.2 Usage of Macron Diacritic

This section extends the investigation into the use of macron diacritic (ū) for marking long vowels in several regions of Gorontalo. Table 2 displays the number of respondents who use the macron diacritic for long vowel representation, alongside the total number of respondents in each region.

Table 2. Distribution of Long Vowel Representation Using Macron Diacritic by Region

Region	Respondents Using Macron Diacritic	Total Respondents	Percentage (%)
Kota Gorontalo	0	70	0.00%
Kabupaten Gorontalo	1	34	2.94%
Bone Bolango	0	28	0.00%
Gorontalo Utara	0	23	0.00%
Pohuwato	0	25	0.00%
Boalemo	0	33	0.00%

1. Overall Trends

The results show very low adoption of the macron diacritic for long vowel representation. Out of all the regions surveyed, only Kabupaten Gorontalo reported any use of the macron diacritic, with just 1 respondent (2.94%) utilizing it. In all other regions, no respondents reported using this diacritic.

2. Variation Between Regions

a. Kota Gorontalo, Bone Bolango, Gorontalo Utara, Pohuwato, and Boalemo reported 0% usage of the macron diacritic. This indicates that the use of this diacritic is not widespread and may not be part of the accepted orthographic conventions in these regions.
b. Kabupaten Gorontalo stands out as the only region where the

macron diacritic was reported, albeit by a very small percentage of respondents (2.94%). This suggests that there may be limited localized knowledge or experimentation with the use of macrons in this region.

3. Implications

The near-complete absence of the macron diacritic in long vowel representation suggests that this diacritic has not been integrated into the orthographic practices of the majority of Gorontalo's population. The lack of usage across most regions may reflect either a lack of awareness of the macron diacritic or a preference for other methods of long vowel representation, such as digraphs or colon diacritic (u:). The isolated use in Kabupaten Gorontalo may indicate early attempts to adopt more formal orthographic conventions, but this has not yet spread to the wider population.

4. Educational and Cultural Considerations

The limited use of the macron diacritic highlights a potential gap in orthographic standardization and education regarding formal diacritical marks in Gorontalo. In regions where macron usage is virtually non-existent, efforts to raise awareness or formalize such conventions could be beneficial, particularly in academic or formal settings where precise phonological representation is required. However, the general preference for simpler writing forms without diacritic markers might also indicate cultural preferences for less complex orthographic systems.

4.3 Usage of Single Grapheme

This section provides findings on the usage of single grapheme to represent long vowels across the surveyed regions in Gorontalo. Table 3 outlines the number of respondents who utilize single graphemes (e.g., "u" or "a" without diacritics or digraphs) for long vowel representation.

Table 3. Distribution of Long Vowel Representation Using Single Grapheme by Region

Region	Respondents Using Single Grapheme	Total Respondents	Percentage (%)
Kota Gorontalo	15	70	21.43%
Kabupaten Gorontalo	14	34	41.18%

Region	Respondents Using Single Grapheme	Total Respondents	Percentage (%)
Bone Bolango	10	28	35.71%
Gorontalo Utara	11	23	47.83%
Pohuwato	9	25	36.00%
Boalemo	14	33	42.42%

1. Overall Trends

The results indicate a moderate to high adoption of the single grapheme method to represent long vowels across the surveyed regions. Gorontalo Utara shows the highest usage rate, with 47.83% of respondents using single graphemes, followed closely by Boalemo (42.42%) and Kabupaten Gorontalo (41.18%). Kota Gorontalo has the lowest adoption rate, with 21.43% of respondents using single graphemes.

2. Variation Between Regions

a. Gorontalo Utara has the highest proportion of respondents using single graphemes (47.83%), indicating a strong preference for this method in the region. This suggests that the orthographic tradition here may prioritize simpler representations without the use of diacritics or digraphs.
b. Boalemo and Kabupaten Gorontalo both show similar trends with over 40% of respondents adopting single grapheme usage, suggesting that the simplification of vowel representation is prevalent in these regions.
c. Kota Gorontalo, the most urbanized region, has the lowest usage rate (21.43%), which may indicate a higher awareness or preference for using more complex orthographic systems like diacritics or digraphs to represent long vowels.

3. Implications

The data show that single grapheme representation is quite common, with several regions reporting adoption rates exceeding 40%. This suggests a general preference for minimalist orthographic systems in certain regions of Gorontalo, where long vowels are represented with a single grapheme rather than with diacritics or digraphs.

This trend could be influenced by the informality of spoken and written language in rural regions, where complex orthographic systems might not

be widely taught or used. On the other hand, in Kota Gorontalo, where the usage rate is the lowest, respondents may have access to more formalized education that encourages the use of digraphs or diacritics.

4. Educational and Cultural Factors
The widespread use of single grapheme representation suggests that there is a cultural and educational preference for simpler writing forms in many regions. This could be driven by practical reasons, such as the ease of use in informal communication and the limited need for formalized vowel marking in daily language use.
However, in regions like Kota Gorontalo, where usage of single graphemes is lower, it is possible that more standardized orthographic conventions are being promoted, particularly in academic or formal writing settings. This difference between regions may reflect varying levels of education and exposure to formalized orthographic practices.

4.4 Usage of Diagraphs

This section examines the usage of digraphs (such as "aa" or "uu") for long vowel representation in different regions of Gorontalo. Table 4 displays the number of respondents who utilize digraphs to represent long vowels, alongside the total number of respondents and their percentage within each region.

Table 4. Distribution of Long Vowel Representation Using Digraph by Region

Region	Respondents Using Digraph	Total Respondents	Percentage (%)
Kota Gorontalo	45	70	64.29%
Kabupaten Gorontalo	17	34	50.00%
Bone Bolango	15	28	53.57%
Gorontalo Utara	10	23	43.48%
Pohuwato	14	25	56.00%
Boalemo	15	33	45.45%

1. Overall Trends
The results show that the use of digraphs is quite prevalent across all regions surveyed, with Kota Gorontalo showing the highest adoption rate at 64.29%. The overall range of usage falls between 43.48% (Gorontalo Utara) and 64.29% (Kota Gorontalo), indicating a fairly high adoption

rate across regions.

2. Variation Between Regions

a. Kota Gorontalo reports the highest usage of digraphs (64.29%), suggesting a strong preference for digraph-based representation of long vowels. This could be attributed to urbanization and higher levels of formal education that promote standard orthographic practices.
b. Pohuwato and Bone Bolango follow with significant percentages of 56.00% and 53.57% respectively, showing that digraphs are a popular method of long vowel representation in these regions as well.
c. Kabupaten Gorontalo and Boalemo also show relatively high usage, with 50.00% and 45.45% of respondents respectively using digraphs. These figures are close to the regional average.
d. Gorontalo Utara, with 43.48%, has the lowest percentage of respondents using digraphs. However, this is still a substantial proportion, indicating that digraphs are fairly common even in this region.

3. Implications

The high percentage of digraph use across regions suggests that digraphs are a well-established method of representing long vowels in Gorontalo. This reflects a widespread orthographic convention that aligns with formal writing practices in both urban and rural areas. Digraphs are particularly effective in simplifying vowel length representation without relying on diacritics or more complex orthographic markers, making them accessible and easy to use for both formal and informal communication.

4. Educational and Cultural Considerations

The widespread adoption of digraphs indicates that this method is likely well-accepted in educational contexts and may be reinforced through school curricula. The consistent use of digraphs across different regions reflects a degree of standardization that could be further reinforced through formal education and language documentation efforts.

However, there may still be regional differences in the understanding or adoption of formalized writing systems, particularly in regions like Gorontalo Utara and Boalemo, where the usage of digraphs is lower

compared to Kota Gorontalo. Targeted educational programs focusing on orthographic consistency may be beneficial in these regions to promote a more uniform approach to vowel representation.

4.5 Usage of Arabic Pegon Script

This section presents findings on the usage of Arabic Pegon script for writing in various regions of Gorontalo. Table 5 illustrates the number of respondents who reported using the Arabic Pegon script, alongside the total number of respondents and their percentage in each region.

Table 5. Distribution of Arabic Pegon Script Usage by Region

Region	Respondents Using Arabic Pegon Script	Total Respondents	Percentage (%)
Kota Gorontalo	2	70	2.86%
Kabupaten Gorontalo	0	34	0.00%
Bone Bolango	0	28	0.00%
Gorontalo Utara	0	23	0.00%
Pohuwato	0	25	0.00%
Boalemo	0	33	0.00%

1. Overall Trends

The data shows very low usage of the Arabic Pegon script for writing across all regions surveyed. The only region where any usage is reported is Kota Gorontalo, with 2 respondents (2.86%). In all other regions—Kabupaten Gorontalo, Bone Bolango, Gorontalo Utara, Pohuwato, and Boalemo—there are 0% respondents who use the Arabic Pegon script.

2. Variation Between Regions

a. Kota Gorontalo stands out as the only region where the Arabic Pegon script is used at all, with a very small percentage of 2.86% of respondents. This likely reflects the urban nature of Kota Gorontalo, where respondents may have more exposure to different writing systems, including traditional ones like Arabic Pegon.
b. In all other regions, no respondents reported using the Arabic Pegon script, indicating that it is not a prevalent form of writing in Kabupaten Gorontalo, Bone Bolango, Gorontalo Utara,

Pohuwato, or Boalemo. This suggests that either the script is not widely known or that it has fallen out of general use in these regions.

3. Implications

The low usage of Arabic Pegon script across all surveyed regions implies that this traditional script may no longer be in active use for writing in Gorontalo, especially outside Kota Gorontalo. Even in Kota Gorontalo, where 2 respondents reported using the script, the adoption rate remains extremely low (2.86%).

The limited use of Arabic Pegon could reflect a shift towards Latin-based writing systems, which are more commonly used in both formal education and daily communication. This trend away from Arabic Pegon may indicate the decline of traditional writing systems, which were historically significant but may now be restricted to niche or ceremonial use.

4. Educational and Cultural Considerations

The decline in the use of Arabic Pegon script highlights the need for cultural preservation efforts if there is a desire to maintain knowledge of this traditional script. Educational initiatives that reintroduce Arabic Pegon in cultural studies or heritage education could help revitalize interest in this script, especially in urban areas like Kota Gorontalo where there is still some familiarity with it.

Additionally, documentation efforts may be necessary to ensure that the knowledge of Arabic Pegon does not disappear entirely. Programs that combine language preservation with cultural heritage such as me'eraji manuscript could be beneficial in retaining the historical significance of this script in the Gorontalo region for Arab Pegon as the second orthography in Gorontalo writing system.

5. Discussion

The results presented in the previous section highlight significant variation in the orthographic practices of vowel length representation and the usage of Arabic Pegon script in Gorontalo. This discussion delves into these findings, analyzing the implications of different methods of vowel representation—diacritic colon (u:), macron (ū), digraphs, and single grapheme—as well as the usage of Arabic Pegon script. Each method's impact on linguistic standardization, cultural preservation, and

educational practices is examined in detail.

5.1 Usage of Diacritics (Colon and Macron)

The findings indicate that the use of diacritic colon (u:) for long vowel representation is relatively low across Gorontalo, with the highest adoption rate in Boalemo (12.12%) and the lowest in Kabupaten Gorontalo (5.88%). Similarly, the use of macron (ū) is almost non-existent, with Kabupaten Gorontalo being the only region where its usage was recorded (2.94%). This indicates a general lack of awareness or preference for these formalized orthographic markers among the population.

The limited use of diacritics might be attributed to pedagogical limitations or the fact that most speakers rely on contextual cues in spoken language rather than written markers to distinguish between long and short vowels. While diacritics offer precision in marking phonological distinctions, their limited adoption in Gorontalo suggests that there is insufficient emphasis on formal orthographic education at the local level (Anderson, 2005). Additionally, digital communication tools that do not easily support the use of diacritics might further discourage their use, particularly among younger generations (Smith, 2016).

5.2 Preference for Digraphs

In contrast to diacritics, the use of digraphs (e.g., "aa" or "uu") is far more common, with Kota Gorontalo showing the highest adoption (64.29%) and Gorontalo Utara the lowest (43.48%). This widespread preference suggests that digraphs provide a simpler and more accessible solution for indicating vowel length, as they do not require specialized characters and are supported across all platforms (Walters, 2017).

The popularity of digraphs across regions may be linked to their use in informal communication and local educational practices. Given that digraphs are easier to implement in both digital and handwritten formats, they serve as a practical compromise between phonological accuracy and ease of use. However, the reliance on digraphs could contribute to regional orthographic variability, especially in areas with lower educational resources (Jones & Foster, 2011). To achieve linguistic standardization, educational efforts must focus on promoting consistent usage of digraphs while also introducing more formalized writing conventions in appropriate contexts.

5.3 Use of Single Grapheme

The adoption of single grapheme to represent long vowels without diacritic markers is also prevalent, particularly in Gorontalo Utara (47.83%) and Boalemo (42.42%). This trend reflects a preference for simplified orthographic practices in certain regions, where the phonological length of vowels is understood through context rather than explicit markers.

The use of single grapheme without diacritics aligns with findings in other low-resource language communities, where simplicity and ease of writing often take precedence over phonological precision (Brown, 2014). However, this practice can result in ambiguous interpretations of written language, particularly for non-native speakers or learners who are not familiar with the spoken language's nuances (Jones & Clark, 2015). Therefore, while single grapheme usage may be convenient for native speakers, it complicates language teaching and could hinder efforts to standardize the writing system across different dialects and regions (Smith & Walsh, 2018).

5.4 The Use of Arabic Pegon Script

The findings indicate that the use of Arabic Pegon script is largely absent across Gorontalo, with only 2 respondents in Kota Gorontalo (2.86%) reporting its use. This aligns with the general trend across Indonesia, where the Latin script has become dominant, relegating traditional scripts like Pegon to ceremonial or religious contexts (Yusuf, 2009).

The near-extinction of Pegon in writing suggests that cultural shifts and the introduction of formal education systems based on Latin script have contributed to the diminishing role of traditional scripts (Harris, 2013). Furthermore, the lack of Pegon usage highlights a broader cultural and linguistic displacement, as younger generations are less likely to learn or use the script (Anderson, 2015). Given the rich history of Pegon in the transmission of Islamic knowledge in Indonesia, its near-disappearance in Gorontalo raises questions about the future of cultural literacy and the preservation of traditional writing systems (Yusuf, 2012).

Efforts to revitalize Arabic Pegon in Gorontalo should consider targeted cultural preservation programs that integrate Pegon into religious education and local heritage initiatives (Anderson, 2015). This could help maintain its significance as a marker of cultural identity, even if its practical use in everyday writing continues to decline.

6. Conclusion

The results highlight a clear preference for digraphs over more formalized methods of vowel representation, such as diacritics or macron, and the limited use of Arabic Pegon suggests a significant shift towards Latin-based scripts. This suggests that while practical and accessible orthographic practices dominate everyday usage, they may hinder linguistic standardization and phonological accuracy. The findings call for targeted educational programs to promote consistent orthographic conventions, while also recognizing the role of cultural preservation efforts in maintaining traditional writing systems like Pegon.

7. AI Acknowledgment

The authors acknowledge the use of **CitedAI** (https://cited.ai) for searching and identifying relevant supporting literature using the prompt: "Find recent scholarly articles on orthographic" Additionally, **ChatGPT** (https://openai.com/chatgpt) was employed to assist in writing and structuring ideas with the prompt: "Help refine the language and structure of this manuscript." The outputs were carefully reviewed, revised, and integrated by the authors to ensure accuracy, originality, and alignment with the research objectives.

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4. **Submission Approved – Sent to Peer Review (3 Desember 2024)**

Universitas Negeri Gorontalo UNGmail

Suleman Bouti <s_bouti@ung.ac.id>

Submission - Approved - WorkID: 105334

noreply@cgscholar.com <noreply@cgscholar.com> 3 Desember 2024 pukul 03.46
Kepada: s_bouti@ung.ac.id

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5. Peer Review Feedback Received (11 Desember 2024)

Universitas Negeri Gorontalo
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noreply@cgscholar.com <noreply@cgscholar.com> 11 Desember 2024 pukul 05.36
Kepada: s_bouti@ung.ac.id

Dear Suleman Bouti,

We have received the peer review reports for your manuscript.

I am pleased to inform you that your manuscript has been Accepted with Major Revisions for publication.

We recently updated our platform, so peer review reports can be submitted in two ways. Peer review reports can be downloaded from the Documents tab and/or viewed from the Peer Reviewer tabs on your Works page. Please check both places: https://cgp.cgscholar.com/m/PendingWork?detail=17748

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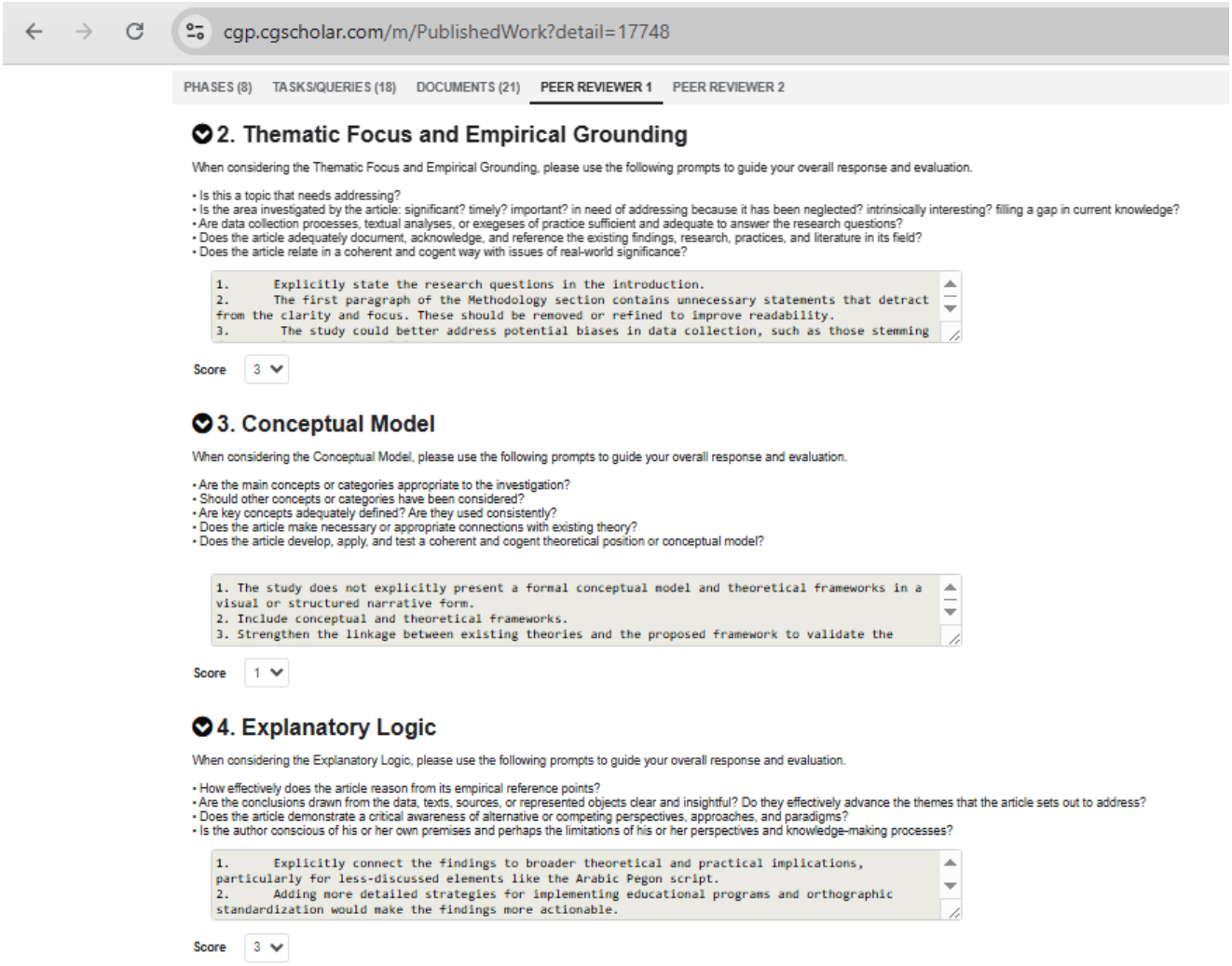
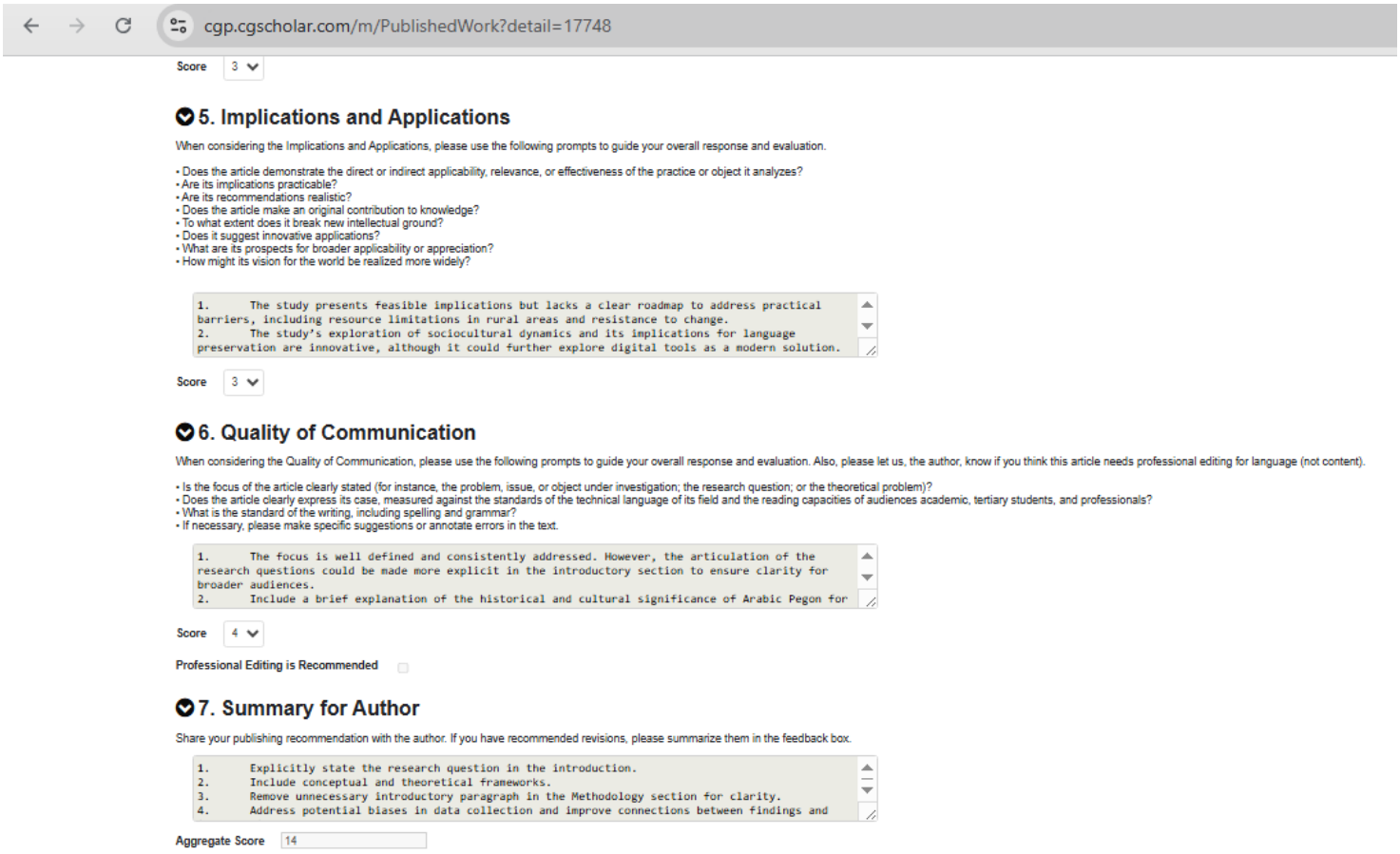
Peer Reviewer 1





Thematic Focus and Empirical Grounding

1. Explicitly state the research questions in the introduction.
2. The first paragraph of the Methodology section contains unnecessary statements that detract from the clarity and focus. These should be removed or refined to improve readability.
3. The study could better address potential biases in data collection, such as those stemming from sampling or regional limitations.
4. The connection between findings and the proposed interventions for standardization could be made more explicit and stronger.
5. Include direct excerpts or detailed summaries from the qualitative data to give readers a clearer sense of the participants' perspectives.
6. Ensure the qualitative findings are explicitly tied to the research questions and linked to the quantitative trends for a more cohesive narrative.
7. Highlight unique insights or contradictions from the qualitative data that might not be evident in the quantitative results, enriching the overall analysis.

Conceptual Model

1. The study does not explicitly present a formal conceptual model and theoretical frameworks in a visual or structured narrative form.
2. Include conceptual and theoretical frameworks.
3. Strengthen the linkage between existing theories and the proposed framework to validate the study's findings.

Explanatory Logic

1. Explicitly connect the findings to broader theoretical and practical implications, particularly for less-discussed elements like the Arabic Pegon script.
2. Adding more detailed strategies for implementing educational programs and orthographic standardization would make the findings more actionable.
3. While the study demonstrates awareness of existing paradigms, it could benefit from exploring alternative frameworks, such as leveraging technology for teaching and preserving orthographic practices.
4. Provide a more detailed discussion of potential biases and how these might influence the study's outcomes.

Implications and Applications

1. The study presents feasible implications but lacks a clear roadmap to address practical barriers, including resource limitations in rural areas and resistance to change.
2. The study's exploration of sociocultural dynamics and its implications for language preservation are innovative, although it could further explore digital tools as a modern solution.
3. Introducing recommendations for leveraging technology (e.g., apps, digital archives) would enhance the article's practical applications and broaden its impact.
4. Highlighting parallels with other endangered languages and explicitly discussing broader applicability would increase the study's global relevance.
5. Collaboration with local communities, policymakers, and technologists would help realize the study's vision on a larger scale. The inclusion of specific case studies or models from other regions could offer a template for global application.

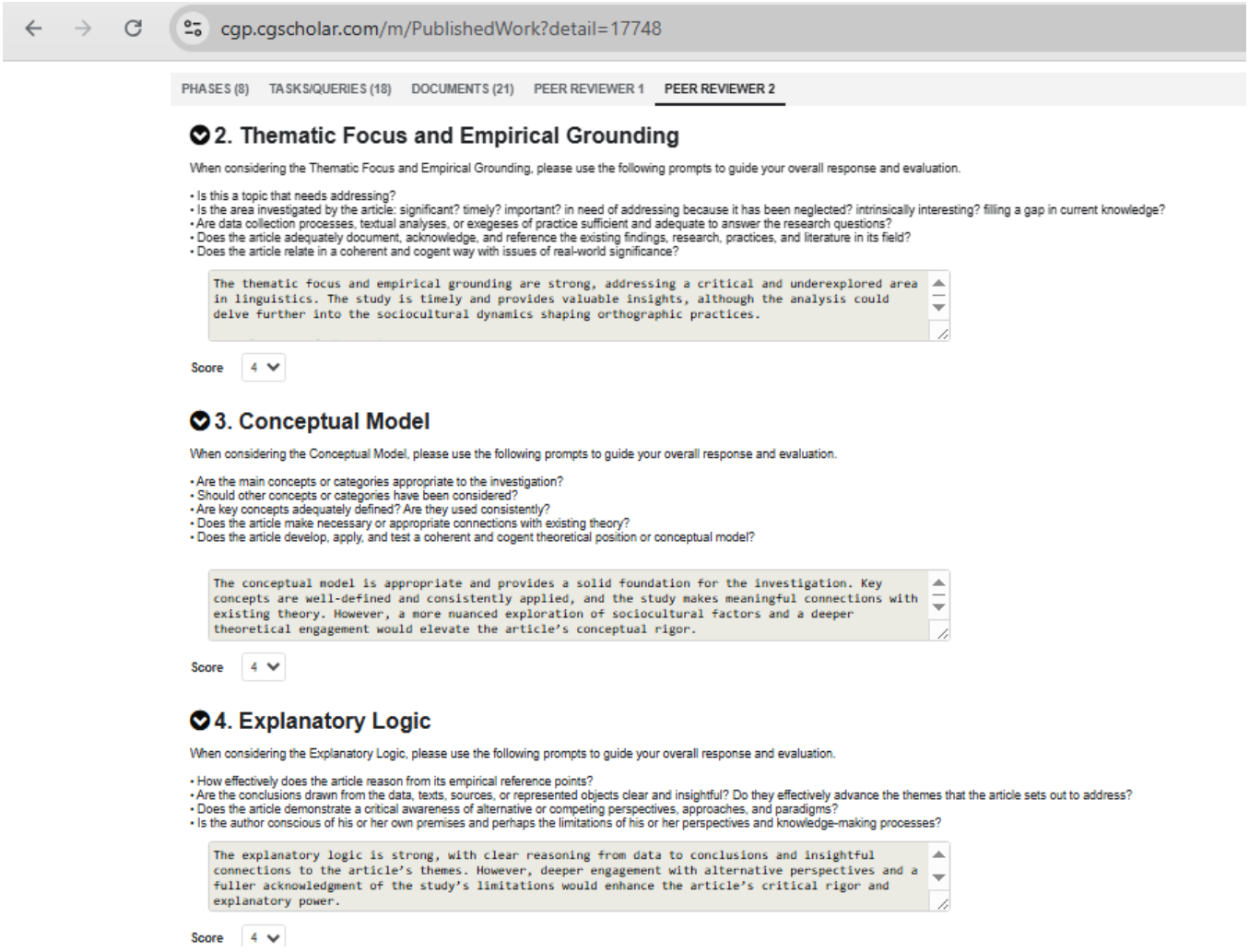
Quality of Communication

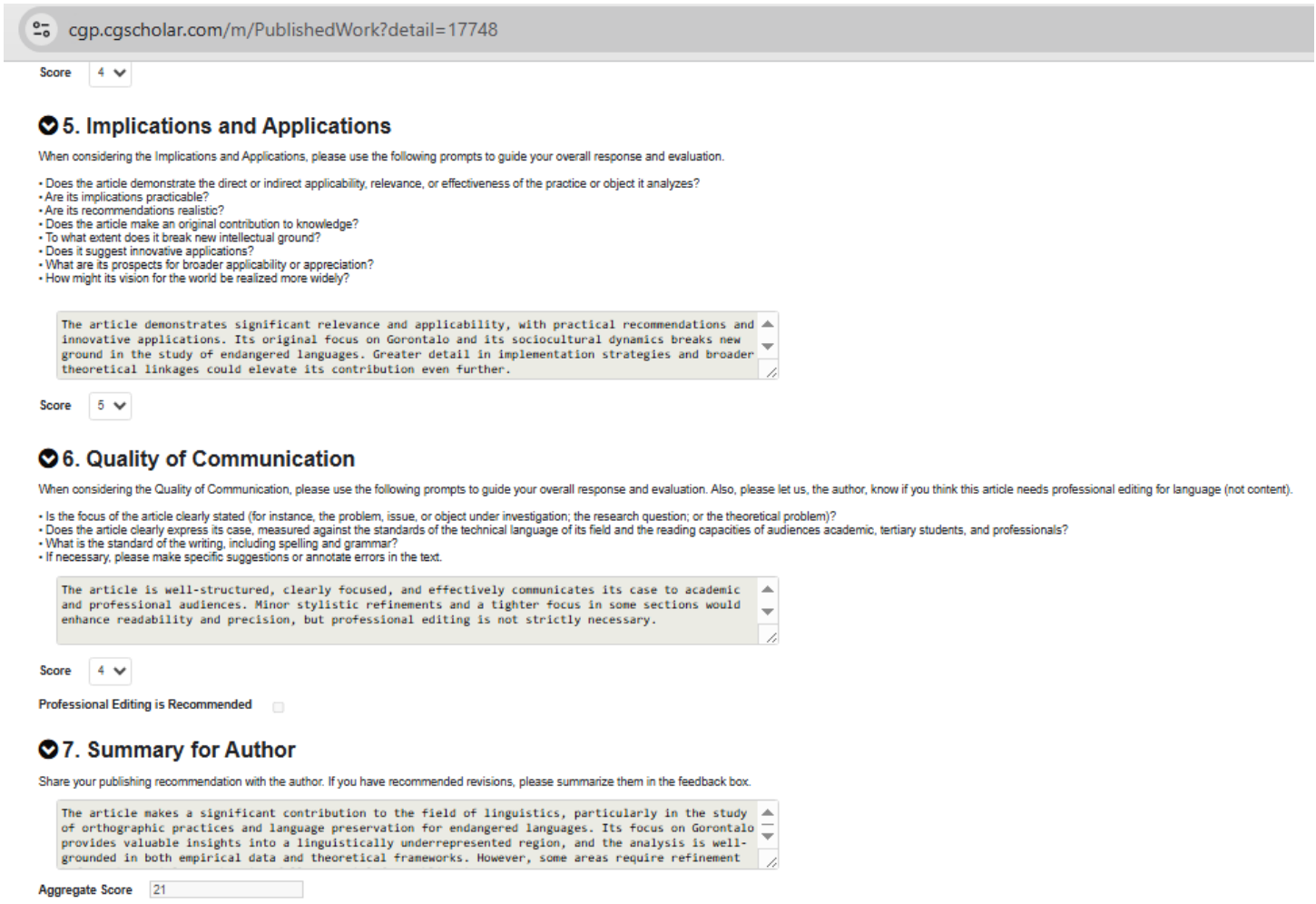
1. The focus is well defined and consistently addressed. However, the articulation of the research questions could be made more explicit in the introductory section to ensure clarity for broader audiences.
2. Include a brief explanation of the historical and cultural significance of Arabic Pegon for readers unfamiliar with Southeast Asian orthographic traditions.
3. Add a clear explanation of "diacritics" and "digraphs" in the introductory sections to make the text more accessible to non-specialist audiences.
4. Address minor issues of redundancy and optimize sentence structure for smoother reading.

Summary for Author

1. Explicitly state the research question in the introduction.
2. Include conceptual and theoretical frameworks.
3. Remove unnecessary introductory paragraph in the Methodology section for clarity.
4. Address potential biases in data collection and improve connections between findings and interventions.
5. Incorporate detailed qualitative data to enrich insights.
6. Strengthen links between findings and existing theories.
7. Provide actionable strategies for educational programs and standardization.
8. Explore alternative frameworks, like leveraging technology for language preservation.
9. Address practical barriers to implementation and explore digital solutions.
10. Highlight global relevance by drawing parallels with other endangered languages.
11. Provide explanations of technical terms for non-specialist audiences.
12. Refine writing for clarity and readability.

Peer Reviewer 2





Thematic Focus and Empirical Grounding

The thematic focus and empirical grounding are strong, addressing a critical and underexplored area in linguistics. The study is timely and provides valuable insights, although the analysis could delve further into the sociocultural dynamics shaping orthographic practices.

1. Relevance of the Topic

The study addresses the orthographic inconsistencies in long vowel representation in Gorontalo, a timely and significant topic. These inconsistencies pose challenges for language preservation and standardization—key concerns for endangered or minority languages. The focus on sociocultural influences adds depth, making the topic not only linguistically significant but also contextually rich.

2. Significance and Timeliness

The article fills a critical gap by exploring orthographic practices in Gorontalo, a language underrepresented in linguistic literature. It addresses both practical implications (e.g., education, documentation) and theoretical concerns (e.g., orthographic representation's impact on phonological integrity). Given global efforts to preserve endangered languages, this research is timely and valuable.

3. Adequacy of Data Collection and Analysis

The mixed-methods approach is robust. The use of 213 respondents across six regions ensures a diverse representation of Gorontalo's linguistic landscape. Combining quantitative data (frequencies of orthographic forms) with qualitative insights (interviews and focus groups) provides a comprehensive view of the issue. The detailed documentation of regional variations enhances the study's empirical grounding.

However, while the methodology is sound, the analysis could better contextualize the sociocultural factors influencing orthographic preferences. For instance, expanding on how educational policies or specific cultural practices perpetuate certain orthographic conventions would strengthen the discussion.

4. Engagement with Existing Literature

The study is well-referenced, integrating a range of scholarly works on orthography, sociolinguistics, and language preservation. Foundational sources (e.g., Fishman, Coulmas) are complemented by regionally relevant studies, ensuring both theoretical rigor and contextual relevance. The inclusion of references to the Arabic Pegon script as part of the cultural discussion is particularly noteworthy.

A minor critique is that while the literature review is thorough, it could benefit from a more critical engagement with existing works. For example, contrasting global trends in orthographic standardization with Gorontalo's unique sociocultural context might yield deeper insights.

5. Real-World Relevance

The research effectively connects linguistic issues to real-world implications, such as education, digital communication, and cultural preservation. The discussion of practical orthographic solutions (e.g., digraphs) alongside traditional practices (e.g., Arabic Pegon) is both pragmatic and culturally sensitive. The study’s recommendations, particularly regarding educational interventions, are actionable and relevant for policymakers and linguists alike.

Conceptual Model

The conceptual model is appropriate and provides a solid foundation for the investigation. Key concepts are well-defined and consistently applied, and the study makes meaningful connections with existing theory. However, a more nuanced exploration of sociocultural factors and a deeper theoretical engagement would elevate the article’s conceptual rigor.

1. Appropriateness of Main Concepts

The article effectively identifies and examines key concepts such as orthographic inconsistency, long vowel representation, and sociocultural influences. These are central to the investigation, given the study's focus on language preservation and the practical challenges of standardization. The inclusion of concepts like diacritics, digraphs, single graphemes, and the Arabic Pegon script aligns with the study's objectives.

However, the treatment of sociocultural dynamics could be expanded to encompass broader concepts like "language ideology" or "orthographic literacy," which may provide deeper theoretical grounding for understanding regional orthographic preferences.

2. Inclusion of Additional Concepts

While the primary concepts are well-chosen, the study might benefit from incorporating:

- Language Ideology: Exploring how cultural and educational perceptions influence the choice of orthographic practices.
- Linguistic Accessibility: Considering how digital platforms or practical constraints shape orthographic adoption, especially in low-resource contexts.
- Community Identity: Analyzing how orthographic choices reflect regional or cultural identities, particularly in contexts where traditional scripts like Pegon are marginal.

Adding these dimensions would deepen the theoretical framework and offer a richer interpretation of the findings.

3. Definition and Consistency

Key concepts are generally well-defined and used consistently throughout the article. Terms such as "digraphs," "diacritics," and "orthographic inconsistency" are clearly delineated. However, the discussion on "sociocultural influences" could be more precise, particularly in how these factors are operationalized in the study. For instance, distinguishing between education-driven practices and those rooted in tradition or identity would enhance clarity.

4. Connections with Existing Theory

The article connects its findings to established theories in orthography and language preservation, citing foundational works (e.g., Coulmas, Fishman). These connections strengthen the study's conceptual foundation. However, the engagement with existing theory sometimes feels surface-level. For example:

- The discussion on diacritics could draw more explicitly on theories of visual processing in writing systems to explain their limited adoption.
- The exploration of Pegon script might benefit from referencing frameworks on script displacement and cultural shift, such as those discussed in Errington (1998).

5. Coherence and Application of Theoretical Position

The article develops a coherent conceptual framework centered on the interplay between linguistic and sociocultural factors. It successfully applies this framework to analyze regional orthographic practices. However, the testing of the theoretical model could be more robust:

- The article could incorporate comparative analysis with other minority languages facing similar orthographic challenges.
- A clearer articulation of how the conceptual model informs the study's methodology and data interpretation would strengthen the connection between theory and practice.

Explanatory Logic

The explanatory logic is strong, with clear reasoning from data to conclusions and insightful connections to the article's themes. However, deeper engagement with alternative perspectives and a fuller acknowledgment of the study's limitations would enhance the article's critical rigor and explanatory power.

1. Reasoning from Empirical Reference Points

The article effectively reasons from its empirical data, which includes quantitative findings (e.g., percentages of respondents using different orthographic practices) and qualitative insights (e.g., interviews and focus group discussions). These data points are systematically analyzed to highlight regional variations and sociocultural influences on orthographic practices. For instance, the preference for digraphs in certain regions is well-connected to accessibility and practicality, while the limited use of diacritics is tied to technological and educational barriers.

However, some explanations could benefit from more depth. For example, the rationale for the near-extinction of the Arabic Pegon script could explore historical and socio-political shifts more comprehensively, beyond globalization and modern education systems.

2. Clarity and Insightfulness of Conclusions

The conclusions are generally clear and align well with the article's objectives. The findings about the widespread use of digraphs and the challenges posed by orthographic inconsistency effectively advance the central theme of language preservation in Gorontalo. The recommendation for targeted educational programs and the need for balancing modern orthographic practices with traditional systems are particularly compelling.

That said, some conclusions, such as the implications of single grapheme usage for language teaching, could be better elaborated. For instance, while the article notes the ambiguity introduced by single graphemes, it stops short of proposing specific strategies to address this challenge in educational contexts.

3. Critical Awareness of Alternative Perspectives

The article demonstrates some awareness of alternative approaches, such as the use of diacritics versus digraphs or the trade-offs between modern Latin-based scripts and traditional Arabic Pegon. However, it could engage more deeply with competing paradigms:

- Competing Linguistic Approaches: The article could consider arguments that prioritize phonological simplicity over precision, particularly in low-resource language communities.
- Educational Strategies: It might explore alternative pedagogical models that have succeeded in other endangered languages with similar challenges.
- Cultural Preservation Paradigms: The discussion on Pegon script could benefit from considering frameworks that advocate for revitalizing traditional scripts alongside modern orthographies.

By more explicitly engaging with these alternative perspectives, the article would demonstrate a stronger critical awareness of the broader debates surrounding orthographic standardization and language preservation.

4. Awareness of Premises and Limitations

The article is generally conscious of its premises, such as the emphasis on education and regional sociocultural factors as primary influences on orthographic practices. It acknowledges the limitations

of these premises, particularly in the uneven access to education across Gorontalo. The study also notes the challenges of integrating traditional scripts like Pegon into modern orthographic practices.

However, the article could further reflect on:

- The limitations of the respondent sample in fully capturing Gorontalo's linguistic diversity.
- Potential biases in the data collection methods, such as the influence of urban-rural divides or technological access on responses.
- The broader implications of focusing on orthographic standardization over other aspects of language preservation, such as oral traditions.

Implications and Applications

The article demonstrates significant relevance and applicability, with practical recommendations and innovative applications. Its original focus on Gorontalo and its sociocultural dynamics breaks new ground in the study of endangered languages. Greater detail in implementation strategies and broader theoretical linkages could elevate its contribution even further.

1. Applicability and Relevance

The article demonstrates both direct and indirect applicability to the fields of language preservation, orthographic standardization, and sociolinguistic education. The discussion of orthographic inconsistencies in Gorontalo is relevant for linguists, educators, and policymakers concerned with endangered languages. The study effectively highlights the practical challenges and sociocultural dynamics influencing orthographic practices, making its findings applicable to similar linguistic contexts globally.

For example:

- Direct Applicability: The emphasis on digraphs as a practical solution aligns with broader trends in low-resource languages and offers a clear pathway for language documentation.
- Indirect Applicability: The discussion on the Arabic Pegon script contributes to understanding the broader phenomenon of script displacement in post-colonial and globalized settings.

2. Practicability of Implications

The implications are generally practicable and well-grounded. Recommendations for targeted educational programs, community-driven standardization initiatives, and the promotion of digraphs as a primary method for long vowel representation are realistic and actionable. The suggestion to incorporate traditional scripts like Pegon into cultural preservation efforts is also achievable, particularly through heritage education and ceremonial contexts.

One area for improvement is the clarity of strategies for addressing regional variability in orthographic practices. While the article identifies these differences, it provides limited guidance on how to reconcile them within a unified framework.

3. Original Contribution and Intellectual Groundbreaking

The study makes an original contribution by focusing on Gorontalo, a linguistically understudied region, and by examining the interplay between orthographic practices and sociocultural factors. Its

nuanced exploration of how education and regional differences shape orthographic conventions offers fresh insights into language preservation.

However, its originality could be further enhanced by:

- Proposing more innovative frameworks for integrating modern and traditional orthographies.
- Exploring parallels with other endangered languages that face similar challenges, which would help establish broader theoretical contributions.

4. Innovative Applications

The article suggests several innovative applications, such as:

- Educational Interventions: Developing region-specific curricula that balance digraphs and diacritics to promote orthographic consistency.
- Digital Tools: Encouraging the integration of diacritic-friendly fonts and keyboards in digital platforms, which could address technological barriers to more precise orthographic practices.
- Cultural Preservation Programs: Revitalizing the Arabic Pegon script through localized heritage initiatives, creating a dual orthography system for cultural and formal uses.

These applications are promising but would benefit from more detailed implementation strategies, particularly for digital and educational tools.

5. Broader Applicability and Realizing Its Vision

The findings and recommendations have broader applicability for other minority languages facing orthographic inconsistency and language shift. The principles of balancing simplicity (e.g., digraphs) with phonological precision (e.g., diacritics) can be applied globally, especially in contexts where technological or educational resources are limited.

To realize its vision more widely, the article could:

- Advocate for international collaboration on endangered language documentation.
- Partner with technology developers to create tools that facilitate the use of both traditional and modern orthographies.
- Build frameworks for comparative studies, linking Gorontalo's challenges to other linguistically diverse regions.

Quality of Communication

The article is well-structured, clearly focused, and effectively communicates its case to academic and professional audiences. Minor stylistic refinements and a tighter focus in some sections would enhance readability and precision, but professional editing is not strictly necessary.

Suggestions for Specific Improvements:

- Abstract: While informative, the abstract is dense. Simplifying it slightly would enhance its impact for a wider audience. For instance:
- Replace: "The inconsistencies present challenges for language preservation, documentation, and standardization efforts." With: "These inconsistencies hinder language preservation and standardization."

- Methodology: Clarify sections by avoiding repetitive descriptions of data collection. For example, consolidate details about questionnaires and interviews into a single cohesive paragraph.
- Discussion: The section on Arabic Pegon script could benefit from more concise language. Avoid repeating its cultural importance in multiple paragraphs unless introducing new insights.

Summary for Author

The article makes a significant contribution to the field of linguistics, particularly in the study of orthographic practices and language preservation for endangered languages. Its focus on Gorontalo provides valuable insights into a linguistically underrepresented region, and the analysis is well-grounded in both empirical data and theoretical frameworks. However, some areas require refinement before the article reaches its full potential for publication.

Summary of Recommended Revisions:

1. Thematic and Conceptual Refinement:
   - Expand the discussion on sociocultural influences, particularly by integrating concepts like "language ideology" and "orthographic literacy."
   - Engage more deeply with alternative perspectives on orthographic practices and language standardization.
2. Methodological Clarity:
   - Streamline the description of research methods to avoid redundancy. For example, consolidate explanations of data collection instruments into a unified narrative.
   - Provide additional context for sociocultural factors influencing regional differences in orthographic choices.
3. Implications and Applications:
   - Elaborate on implementation strategies for the proposed recommendations, such as practical steps for integrating traditional scripts or promoting digraph-based standards in education.
   - Explore the broader applicability of findings to other endangered languages facing similar orthographic challenges.
4. Communication and Style:
   - Refine sections for conciseness, particularly in the abstract, methodological details, and discussions of theoretical significance.
   - Ensure consistency in terminology and avoid verbose constructions to improve readability.

6. **Submission of Revised Manuscript (23 Januari 2025)**

Orthographic Representation of ~~Inconsistencies in~~ Long Vowels ~~Representation~~ in Gorontalo: A Linguistic and Sociolinguistic Perspective on Tradition and Technology~~Sociocultural Analysis for Language Preservation~~

Suleman Bouti[1], Asna Ntelu[2], Muziatun[3], Ela Budiarti[4], Ari[5], Doni Dondo[6]

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Abstract

This study examines~~investigates~~ the orthographic ~~inconsistencies in the~~ representation of long vowels in ~~the~~ Gorontalo ~~language~~, focusing on the sociolinguistic interplay between tradition and technology.~~use of diacritics, digraphs, single graphemes, and the traditional Arabic Pegon script~~. Data were collected from ~~The inconsistencies present challenges for language preservation, documentation, and standardization efforts. A mixed-methods approach was employed, involving~~ 213 respondents across six administrative regions using a mixed-methods approach to explore preferences for single graphemes, digraphs, and diacritics in varied sociocultural and technological contexts. ~~from six regions in Gorontalo. Data were collected through questionnaires, interviews, and focus group discussions.~~ The findings reveal distinct patterns: rural communities primarily retain single graphemes, reflecting oral traditions that emphasize suprasegmental features like rhythm and intonation. In contrast, urban areas adopt digraphs for their practicality in digital communication, while diacritics are predominantly confined to formal educational settings with minimal use in everyday contexts. Technology significantly shapes orthographic preferences, with digital tools promoting modern practices in urban areas, while technological limitations in rural regions sustain traditional systems. Education emerges as a pivotal factor, offering opportunities to reconcile local traditions with contemporary demands through community-based curricula. This study contributes to global discourses on orthographic representation, sociolinguistic identity, and the integration of tradition with technological

advancements. The Gorontalo case illustrates how orthographic practices act as cultural artifacts, mediating identity and communication amid rapid social and technological change.~~The analysis focused on how different orthographic forms are utilized and the sociocultural factors that influence these practices. The findings reveal significant variations in long vowel representation across regions. Digraphs are the most commonly used method, while diacritics and the Arabic Pegon script are rarely adopted. The study highlights how education levels and sociocultural shifts influence these orthographic preferences, leading to regional differences and challenges in achieving orthographic standardization. The study concludes that while digraphs are prevalent, the lack of a unified system for representing long vowels in Gorontalo complicates language preservation efforts. Standardization and educational programs are necessary to promote consistent orthographic practices, particularly for future language documentation and preservation.~~

Keywords: Orthographic representation~~Orthography~~, long vowels, Gorontalo, sociolinguistics, digital communication. ~~language preservation, digraphs, diacritics~~.

1. Introduction

~~Orthography plays a pivotal role in language preservation, especially for endangered languages, as it provides a standardized method of representing the sounds and structure of a language. In the case of the Gorontalo language, spoken predominantly in the Gorontalo province of Indonesia, inconsistencies in the representation of long vowels present significant challenges for language documentation, education, and transmission to future generations (Anderson, 2015; Coulmas, 2003). These challenges are exacerbated by regional variations in the use of diacritics, digraphs, and single graphemes, all of which contribute to difficulties in achieving a unified writing system for the language (Walters, 2017).~~

~~Long vowels, which can differentiate meaning in Gorontalo, are represented inconsistently across different regions. Diacritics such as the colon (u:) or macron (ū) are used in some areas, while others rely on simpler digraphs (aa, uu) or even single graphemes (a, u) (Smith, 2016; Sebba, 2007). This variability complicates communication and threatens the phonological integrity of the language, making it difficult for~~

speakers to adopt a standardized orthography that can be universally taught and utilized (Jones & Clark, 2015). Without a consistent system for representing long vowels, Gorontalo risks further fragmentation in its written form, which could lead to a loss of linguistic and cultural identity over time (Walters, 2017; Fishman, 2001).

The use of diacritics in writing systems worldwide, including in Gorontalo, serves to clarify phonological distinctions, but their adoption is often hindered by a lack of formal education or technical limitations (Daniels, 2010; Coulmas, 2003). For instance, in urban areas like Kota Gorontalo, there is a higher tendency to use diacritics, whereas rural regions like Pohuwato and Boalemo tend to prefer simpler methods such as digraphs or unmarked vowels (Walters, 2017). Studies suggest that educational access and exposure to formal linguistic practices significantly influence the adoption of more complex orthographic systems (Anderson, 2015; Baker, 2011).

Digraphs, which involve the doubling of vowel letters to indicate length (e.g., aa or uu), offer a simpler and more accessible method for representing long vowels and are widely used in many languages with shallow orthographies (Rogers, 2005; Simpson, 2006). In Gorontalo, digraphs are especially prevalent in regions with limited formal education, where the use of diacritics may be impractical due to technological constraints or a lack of familiarity (Walters, 2017). While digraphs provide a straightforward solution, their use contributes to regional variability in orthographic practices, which poses a barrier to standardization (Smith & Walsh, 2018).

Sociocultural factors also play a crucial role in shaping orthographic conventions in Gorontalo. Traditional scripts such as Arabic Pegon, once used widely in religious and cultural contexts, have largely fallen out of use, replaced by Latin-based scripts except in specific ceremonial settings (Yusuf, 2009; Anderson, 2015). This transition reflects broader cultural shifts driven by globalization and modern education systems, where the practical use of traditional scripts has diminished (Harris, 2013). The decline in the use of Arabic Pegon raises concerns about the loss of cultural heritage and highlights the need for balancing modern linguistic practices with efforts to preserve traditional writing systems (Errington, 1998; Sneddon, 2003).

The inconsistencies in orthographic practices not only affect language standardization but also have significant implications for education. In regions with more developed educational infrastructures, speakers are

~~more likely to adopt formalized orthographic markers such as diacritics, while in rural areas, simpler forms such as digraphs or single graphemes dominate (Jones & Clark, 2015; Anderson, 2015). This divide underscores the need for educational interventions aimed at promoting consistent orthographic practices across all regions of Gorontalo to support both language preservation and effective communication (Walters, 2017).~~

~~Standardizing the orthographic representation of long vowels is essential for ensuring the survival of the Gorontalo language and preserving its phonological integrity. The development of a unified writing system that accounts for regional and sociocultural differences is crucial for maintaining linguistic continuity while also adapting to the modern educational and technological landscape (Smith, 2016; Walters, 2017). By addressing these orthographic inconsistencies, Gorontalo can enhance its language preservation efforts and foster a greater sense of cultural identity.~~ Orthographic systems play a central role in supporting literacy, written communication, and cultural preservation, particularly in the context of minority languages that are vulnerable to the pressures of modernization. As the visual representation of spoken language, orthography enables the relationship between graphemes and phonemes to be translated into consistent and meaningful written forms (Coulmas, 2003; Crystal, 2010). However, for minority languages such as Gorontalo, the challenge of developing a stable and relevant orthographic system remains a pressing issue. In particular, inconsistencies in orthographic representation, especially of long vowels, pose significant barriers to literacy and intergenerational comprehension.

Long vowels serve an essential phonemic function in Gorontalo, where their presence directly affects word meaning. For instance, the words *tu'o* (vomit) and *tuu'o* (hidden) illustrate how variations in vowel length produce substantial semantic differences. Yet, variability in writing practices—ranging from the use of diacritics, digraphs, or omission of vowel-length markers—frequently generates ambiguity, hindering literacy and reducing clarity in written communication (Ladefoged & Johnson, 2015).

This issue is not unique to Gorontalo. Similar challenges are observed in other minority languages worldwide. For example, in Botswana, orthographic inconsistencies in Khoisan languages have impeded literacy development and weakened cultural recognition (Chebanne, 2015). In Laos, community-based reforms of the Hmong language's orthography

successfully established a culturally relevant and phonologically accurate writing system, significantly improving literacy (Dubost et al., 2019). Likewise, in Vietnam, orthographic reforms in the Cham language have demonstrated how accurate phonological representation can strengthen literacy while revitalizing cultural identity.

In Indonesia, orthographic inconsistencies extend beyond Gorontalo to other regional languages, including Sundanese, Bugis, and Minangkabau. Challenges in representing phonological elements, such as vowel length, create obstacles to literacy, particularly among younger generations who are more accustomed to the standardized orthography of Indonesian. For Gorontalo, this issue is exacerbated by the dominance of Indonesian as the national language, which has increasingly replaced many functions of Gorontalo in daily communication.

Socio-cultural dynamics also play a crucial role in shaping orthographic preferences among Gorontalo communities. Research indicates that orthographic conflicts often reflect underlying power hierarchies and language ideologies within societies (Villa & Vosters, 2015). The dominance of Indonesian has not only accelerated the marginalization of Gorontalo but also created a disconnect between traditional practices and modern needs. Conversely, community-based approaches have proven effective in addressing such challenges. For example, Dondelewski and Czopek (2022) highlighted how local community involvement in orthographic reforms can strengthen a sense of ownership over the language and enhance consistency in writing systems.

Although substantial research has explored orthography in minority languages, most studies primarily focus on phonological and morphological descriptions, neglecting in-depth examination of socio-cultural and technological dimensions. Community-based approaches, successfully implemented in orthographic reforms for languages such as Maori in New Zealand and Khoisan in South Africa, have yet to be widely applied to Gorontalo (Chebanne, 2015; Smith & Walsh, 2018). Additionally, while advancements in digital tools such as local keyboards and AI-powered applications show significant potential to enhance orthographic consistency, their utilization remains minimal in the context of Gorontalo.

The Gorontalo language faces substantial challenges due to orthographic inconsistencies, particularly in the representation of long vowels. The ambiguity arising from varying writing practices poses significant barriers to literacy and written communication. Moreover, the absence of

clear orthographic guidelines, limited technological support, and the dominance of Indonesian exacerbate these issues. A holistic approach is therefore required to bridge the gaps between linguistic needs, socio-cultural dynamics, and technological solutions for Gorontalo's writing system.

This study aims to examine the variations in the practice of writing long vowels across different regions of Gorontalo, with a particular focus on the distribution of graphemes, diacritics, and digraphs. Additionally, it seeks to analyze the influence of socio-cultural factors, such as local traditions and generational differences, on the orthographic preferences among Gorontalo communities. Another key objective is to evaluate the impact of digital tools, including localized keyboards and AI-based applications, in enhancing orthographic consistency and helping to preserve the Gorontalo language.

The study addresses three primary aspects. First, from a linguistic perspective, it examines variations in the practice of writing long vowels across Gorontalo. Second, it explores the socio-cultural dimensions of orthographic preferences, considering traditional values, generational differences, and social contexts. Finally, from a technological standpoint, the study evaluates the potential of digital tools to support orthographic consistency and promote language preservation.

~~2. Literature Review~~

~~2.1 Orthographic Inconsistencies in Long Vowel Representation~~

~~Orthographic consistency is crucial for language preservation, especially in endangered languages like Gorontalo. In the case of Gorontalo, the representation of long vowels has been inconsistent, with various methods employed across different regions. These methods include the use of diacritics, such as the colon (u:) and macron (ū), as well as digraphs (aa, uu), and single graphemes. This inconsistency complicates efforts to preserve the language and maintain its phonological accuracy (Coulmas, 2003; Walters, 2017). The lack of a unified orthography threatens both the language's phonological integrity and cultural heritage, highlighting the importance of developing a consistent system (Anderson, 2015; Smith & Walsh, 2018).~~

~~2.2 Linguistic Importance of Long Vowel Representation~~

~~Vowel length is a significant phonological feature in many languages, including Gorontalo, where it plays a crucial role in distinguishing word~~

meanings and syntactical structures. Inconsistent representation of long vowels across regions results in communication barriers, affecting both the local population and broader educational contexts. Orthographic practices that fail to accurately represent vowel length can hinder language preservation efforts, as written forms are essential for documentation and transmission (Walters, 2017; Jones & Clark, 2015). Research shows that standardizing orthography is necessary to ensure languages like Gorontalo remain accessible to speakers and learners alike (Anderson, 2015; Spencer, 1997).

2.3 Diacritics: Theoretical Perspectives and Practical Challenges

Diacritics are essential in many writing systems for marking phonological distinctions, such as vowel length. In the case of Gorontalo, diacritics like the colon (u:) and macron (ū) are used by some speakers, particularly in urban areas, but remain uncommon in rural regions (Smith, 2016; Anderson, 2015). Although diacritics provide phonological precision, their adoption in Gorontalo has been limited, largely due to factors like lack of formal education and the challenges of using these symbols in digital communication (Daniels, 2010; Coulmas, 2003). Studies suggest that promoting the use of diacritics could enhance language precision, but widespread adoption is hindered by technological and educational barriers (Sebba, 2007; Walters, 2017).

2.4 Digraphs: A Simpler Alternative

In contrast to diacritics, digraphs (e.g., aa, uu) offer a simpler method for representing long vowels and are widely used in languages with shallow orthographies (Simpson, 2006; Rogers, 2005). In Gorontalo, digraphs are particularly common in rural regions, where they are favored for their simplicity and ease of use (Walters, 2017; Brown, 2014). The use of digraphs reflects broader trends in low-resource languages, where practical considerations often take precedence over linguistic accuracy. However, the reliance on digraphs also contributes to regional orthographic variability, which complicates efforts to achieve standardization (Smith & Walsh, 2018; Nettle & Romaine, 2000).

2.5 Single Graphemes and Simplified Orthographies

In many regions of Gorontalo, particularly rural areas like Pohuwato and Boalemo, speakers often use single graphemes (e.g., a, u) to represent long vowels, foregoing diacritics and digraphs altogether (Jones &

Foster, 2011; Anderson, 2005). This practice is common in informal writing and reflects the simplicity and practicality preferred by many speakers. However, the use of single graphemes can lead to ambiguity, especially for non-native speakers or learners unfamiliar with the nuances of spoken Gorontalo (Walters, 2017; Anderson, 2015). Simplified orthographies, while easier to use, pose challenges for language teaching and preservation, as they fail to capture important phonological distinctions (Brown, 2014; Spencer & Zwicky, 1998).

2.6 Sociocultural Influences on Orthographic Practices

The sociocultural context of Gorontalo significantly influences orthographic choices. Historically, the Arabic Pegon script was used in religious texts, but its usage has declined, with most speakers now relying on Latin-based orthographies (Yusuf, 2009; Anderson, 2015). The shift from traditional to modern orthographic systems reflects broader cultural changes, including globalization and the increasing influence of formal education (Errington, 1998; Harris, 2013). In contemporary Gorontalo, the use of traditional scripts like Pegon is limited to specific contexts, such as religious ceremonies, raising concerns about the loss of cultural heritage (Yusuf, 2012; Gauthier, 2010). Balancing the use of traditional and modern orthographies remains a challenge for language preservation.

2.7 Regional Variability in Orthographic Practices

Regional differences in educational access and cultural exposure contribute to variability in orthographic practices in Gorontalo. Urban regions, such as Kota Gorontalo, are more likely to adopt formal orthographic markers like diacritics due to greater access to education (Walters, 2017; Smith, 2016). In contrast, rural regions, such as Gorontalo Utara and Pohuwato, tend to favor simpler methods like digraphs or single graphemes, reflecting limited educational resources and exposure to formal linguistic practices (Jones & Clark, 2015). These regional disparities highlight the need for targeted educational interventions to promote consistent orthographic practices across Gorontalo (Baker, 2011; Anderson, 2015).

2.8 Educational Implications of Orthographic Inconsistency

The inconsistencies in orthographic practices have significant implications for education in Gorontalo. In regions with well-developed educational infrastructure, speakers are more likely to use formalized

~~orthographic systems, including diacritics and digraphs (Walters, 2017; Anderson, 2015). However, in rural areas with less access to education, simpler forms like single graphemes dominate, making language learning more difficult and reducing phonological clarity (Jones & Clark, 2015). Research has shown that providing consistent orthographic instruction can significantly improve literacy rates and enhance language preservation efforts in minority communities (Fishman, 2001; Anderson, 2015).~~

~~2.9 Orthographic Standardization and Language Preservation~~

~~Orthographic standardization is essential for preserving endangered languages like Gorontalo. Without a unified writing system, the language risks further fragmentation, which could lead to a loss of cultural and linguistic identity (Walters, 2017). Studies on language preservation have emphasized the importance of consistent orthographic practices in maintaining linguistic continuity and facilitating language transmission to future generations (Hinton & Hale, 2001; Anderson, 2015). In Gorontalo, standardizing the representation of long vowels, while accounting for regional and sociocultural differences, is a critical step toward ensuring the survival of the language (Smith & Walsh, 2018; Fishman, 2001).~~

~~The orthographic inconsistencies in the representation of long vowels in Gorontalo present significant challenges for language preservation. Regional, educational, and sociocultural factors all contribute to variability in orthographic practices, complicating efforts to create a standardized writing system. Standardizing the representation of long vowels is essential for ensuring the continued survival and vitality of the Gorontalo language. Efforts to promote formalized orthographic instruction and incorporate traditional writing systems, such as Arabic Pegon, into cultural preservation initiatives are crucial steps toward this goal (Yusuf, 2012; Anderson, 2015).~~

2. Methodology

2.1 Research Approach

This study employs a descriptive-exploratory approach with mixed methods, integrating quantitative and qualitative data to provide a comprehensive understanding of the distribution of long vowel orthography in Gorontalo, as well as the sociocultural influences and the impact of technology and education on orthographic consistency. This approach was chosen as it offers deeper insights than relying on a single

method alone (Creswell, 2014; Tashakkori & Teddlie, 2010). The descriptive-exploratory design was used to examine existing orthographic patterns, while the mixed methods approach provided flexibility in combining statistical and thematic analyses (Yin, 2018; Flick, 2004).

~~**3. Methodology**~~

~~Figures, maps and tables should be in the format given in Table 1 and Figure 1. Table captions should be placed above the table. Captions of figures, maps or pictures should be placed below. Please leave a blank line before and after the tables/figures/maps/pictures. If there are any Chinese characters in them, please convert to traditional characters.~~

2.2 Research Location and Participants

The research was conducted across six administrative regions in Gorontalo Province: Gorontalo City, Gorontalo Regency, Bone Bolango Regency, Boalemo Regency, Pohuwato Regency, and North Gorontalo Regency. These regions were selected to capture the social, cultural, and geographical diversity relevant to the distribution of orthographic practices. The participants comprised 213 individuals selected through purposive sampling, a method suitable for qualitative research as it allows the selection of participants with in-depth knowledge of the study topic (Neuman, 2014; Etikan et al., 2016). Participants included students, teachers, indigenous community members, and digital technology users to capture the dynamics of orthography across domains such as formal education, digital communication, and local cultural traditions (Israel & Hay, 2006).

2.3 Data Collection Procedures

Data were collected through surveys, semi-structured interviews, and focus group discussions (FGDs). Triangulation of data was employed to enhance the validity and reliability of the research findings by combining multiple methods and data sources (Denzin, 1978).

1. Survey
   The survey utilized structured questionnaires to document the distribution of long vowel orthographic practices, including diacritics, digraphs, and single graphemes. The survey provided quantitative data to capture general preferences across the six research locations (Bryman, 2016; Field, 2018).
2. Semi-Structured Interviews

Semi-structured interviews were designed to delve deeper into the sociocultural factors influencing orthographic preferences in Gorontalo. They allowed participants to elaborate on their preferences and the role of technology and education in shaping their orthographic practices (Guest et al., 2012).

3. Focus Group Discussions (FGDs)
   FGDs were conducted to discuss the opportunities and challenges in implementing a dual-system orthographic model. These discussions involved representatives from local communities, teachers, and language practitioners to identify needs and expectations for orthographic reform (Chebanne, 2015; Smith & Walsh, 2018).

2.4 Research Instruments

This study employed three types of instruments:

1. Questionnaires: Used to measure the distribution of orthographic usage and participants' perceptions of orthographic consistency within their respective regions (Bryman, 2016; Creswell & Poth, 2018).
2. Interview Guides: Developed to explore social and technological dimensions of orthographic preferences (Neuman, 2014; Braun & Clarke, 2006).
3. FGD Guidelines: Designed to analyze collective perspectives on the development and application of a dual-system orthographic model (Israel & Hay, 2006; Creswell & Poth, 2018).

2.5 Data Processing and Analysis Procedures

1. Quantitative Analysis
   Data from the surveys were analyzed using descriptive statistics to identify the distribution of diacritics, digraphs, and single graphemes across the six research locations. This analysis provided a detailed understanding of orthographic preferences in various social contexts (Field, 2018; Tashakkori & Teddlie, 2010).
2. Qualitative Analysis
   Data from interviews and FGDs were analyzed thematically to identify patterns, themes, and relationships relevant to the orthographic preferences of Gorontalo communities. This method is effective for exploring the sociocultural dimensions within the

research context (Braun & Clarke, 2006; Guest et al., 2012).

2.6 Ethical Considerations

This study adhered to research ethics guidelines by ensuring that all participants were fully informed about the research objectives, methods, and their rights as participants. Participation was voluntary, with written informed consent obtained from all participants. Data confidentiality was strictly maintained throughout the research process and subsequent publication (Israel & Hay, 2006; Babbie, 2020).

2.7 Data Reliability and Validity

To ensure data reliability and validity, a pilot test of the questionnaire was conducted with 10 respondents before the main survey. Additionally, methodological triangulation was employed to compare findings from the survey, interviews, and FGDs, enhancing the credibility and trustworthiness of the research results (Denzin, 1978; Lincoln & Guba, 1985).

~~**3.1 Research Design**~~

~~This study uses a descriptive corpus-based approach to analyze orthographic inconsistencies in the Gorontalo language. The corpus method allows for the objective analysis of linguistic data collected from real-world contexts (Coulmas, 2003; Anderson, 2015). This design is suitable for capturing linguistic variations, particularly in long vowel representation, across different sociocultural and regional contexts. By incorporating both quantitative and qualitative analyses, the study provides a comprehensive overview of how long vowels are represented, and the factors that influence orthographic choices (Walters, 2017; Fishman, 2001).~~

~~A cross-sectional survey was conducted to collect data from native Gorontalo speakers across six regions. This approach provides a snapshot of current orthographic practices, facilitating the exploration of regional variations in the use of diacritics, digraphs, and single graphemes (Jones & Clark, 2015; Rogers, 2005).~~

~~**3.2 Respondents**~~

~~The respondents were selected through purposive sampling to ensure the inclusion of a diverse range of native Gorontalo speakers, particularly those from different educational and regional backgrounds. A total of 213 respondents from six regions – Kota Gorontalo, Kabupaten Gorontalo,~~

Bone Bolango, Gorontalo Utara, Pohuwato, and Boalemo – were chosen for the study. This sample captures a mix of urban and rural areas, allowing for the exploration of both traditional and modern orthographic practices (Jones & Foster, 2011; Anderson, 2015).

The distribution of respondents reflects the linguistic diversity of Gorontalo-speaking communities. This diverse sample ensures that the study can account for how access to education, regional sociocultural contexts, and exposure to formal writing systems influence orthographic tendencies (Fishman, 2001; Anderson, 2005).

3.3 Instruments

The study used a combination of questionnaires, interviews, and focus group discussions (FGD) to collect data. The primary instrument was a structured questionnaire designed to gather information on how respondents represent long vowels in writing. This instrument focused on four key orthographic practices:

1. Diacritics (colon and macron): Questions focused on the frequency of using a colon (u:) and macron (ū) to mark long vowels.
2. Digraphs (aa, uu): Respondents were asked about their use of vowel digraphs.
3. Single graphemes (a, u): Questions explored whether single graphemes are used without any markers to denote vowel length.
4. Arabic Pegon script: Questions regarding the use of this traditional script in modern contexts were included to examine its sociocultural significance (Daniels, 2010; Yusuf, 2009).

To gain deeper insights and validate the trends found in the questionnaires, interviews were conducted with representative respondents from each region. These interviews aimed to clarify the respondents' reasoning for choosing specific orthographic forms and to gather their views on language preservation. Additionally, Focus Group Discussions (FGD) were held with select respondents to further discuss the factors influencing orthographic choices, their perceptions of Gorontalo's written language, and the role of orthography in language preservation (Smith, 2016; Hinton & Hale, 2001).

3.4 Data Collection

Data collection occurred over a two-month period between June and August 2024, using both in-person and online distribution methods. In urban areas such as Kota Gorontalo, respondents completed the

questionnaires electronically via google form, while in rural areas, the data were collected in person with the help of local community leaders (Walters, 2017; Smith, 2016). This mixed method approach ensured a broad reach and allowed for the inclusion of respondents from regions with limited internet access, such as Pohuwato and Boalemo.

A pre-test of the questionnaire was conducted with 10 participants to ensure the instrument's clarity and reliability. Based on feedback from this pilot test, minor adjustments were made to the questionnaire before full-scale data collection. Ethical considerations were observed throughout the study, including obtaining informed consent from all participants and maintaining their anonymity (Fishman, 2001; Anderson, 2015).

3.5 Data Analysis

The collected data were analyzed using both quantitative and qualitative methods to comprehensively understand the orthographic tendencies and the sociocultural factors influencing them.

1. Quantitative Analysis:
    a. Data Coding: Responses from the questionnaires were numerically coded based on the frequency and type of orthographic practices used (e.g., diacritics, digraphs, single graphemes). This allowed for statistical analysis of the frequency and regional distribution of each orthographic form (Walters, 2017; Anderson, 2005).
    b. Descriptive Statistics: Frequencies and percentages were calculated for each orthographic feature across the six regions. This provided insights into how specific markers are used and highlighted the patterns of orthographic usage (Coulmas, 2003; Jones & Clark, 2015).
    c. Cross-tabulation: Cross-tabulation was performed to identify relationships between demographic factors (e.g., educational background, age, region) and orthographic practices. This analysis helped uncover correlations between the use of certain orthographic markers and the sociocultural context (Walters, 2017; Anderson, 2015).
2. Qualitative Analysis:
    Interviews and FGD: Data from interviews and FGDs were transcribed and analyzed thematically. The qualitative data provided deeper insights into the reasons behind orthographic choices and the

~~sociocultural significance of these practices. This analysis helped uncover the motivations behind using certain markers, as well as respondents' views on the preservation of the Gorontalo language through orthographic consistency (Yusuf, 2009).~~

~~3.6 Ethical Considerations~~

~~The study adhered to ethical guidelines to protect the rights and privacy of participants. All respondents were informed about the purpose of the research and their role in it. Informed consent was obtained before participation, and anonymity was ensured by not collecting any identifying information beyond basic demographic data (Smith, 2016; Fishman, 2001). Participants were also given the option to withdraw from the study at any time, without consequence, in line with ethical best practices in social science research (Anderson, 2015).~~

~~The methodology employed in this study provides a comprehensive framework for understanding the orthographic inconsistencies in long vowel representation in Gorontalo. By combining corpus analysis with quantitative and qualitative research methods, this study captures both the frequency of different orthographic forms and the sociocultural factors influencing their usage. The insights gained from this research will contribute to efforts toward orthographic standardization and language preservation, ensuring that the Gorontalo language is transmitted effectively to future generations (Walters, 2017; Anderson, 2015).~~

3. Results

3.1 Distribution of Long Vowel Orthographic Practices

With modernization, social media and digital communication have transformed how communities choose orthographic patterns, particularly in urban areas where efficiency emerges as a dominant factor (Baron, 2020; Tagg & Seargeant, 2021). However, tradition continues to play a significant role in rural areas, reflecting how communication patterns are preserved as a form of cultural identity (Finnegan, 2012; Pauwels, 2016). The orthographic choices of Gorontalo communities highlight the interplay between cultural traditions, social dynamics, and technological influences. In this context, urban areas such as Gorontalo City exhibit progressive adoption of technology, with digraphs dominating orthographic practices. Conversely, rural areas like North Gorontalo and Boalemo tend to retain single graphemes, aligning with oral traditions rich in suprasegmental elements such as intonation and rhythm

(Anderson & Harrison, 2022; Leith, 2020).
These findings are visualized through grouped bar charts and heatmaps, offering comprehensive insights into the distribution of orthographic practices, driving factors, and respondent characteristics across the six regions of Gorontalo (see Figure 1.)

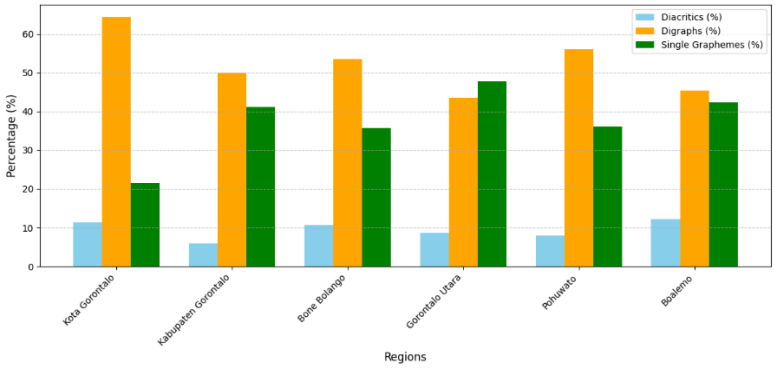

Figure 1. Distribution of Orthographic Practices Across Regions

The grouped bar chart illustrates the distribution of diacritics, digraphs, and single graphemes across six regions in Gorontalo. Gorontalo City demonstrates a dominance of digraphs (64.29%), reflecting the urban community's emphasis on efficiency in digital communication. Digraphs are preferred for their ability to expedite communication without compromising meaning, aligning with the findings of Herring, Stein, & Virtanen (2021), who noted that digital language prioritizes speed and practicality.
In contrast, rural regions like North Gorontalo exhibit a dominance of single graphemes (47.83%), closely tied to oral traditions. As explained by Ong (2012), oral traditions rely heavily on suprasegmental features such as intonation and stress, with written forms functioning merely as complements to spoken language.

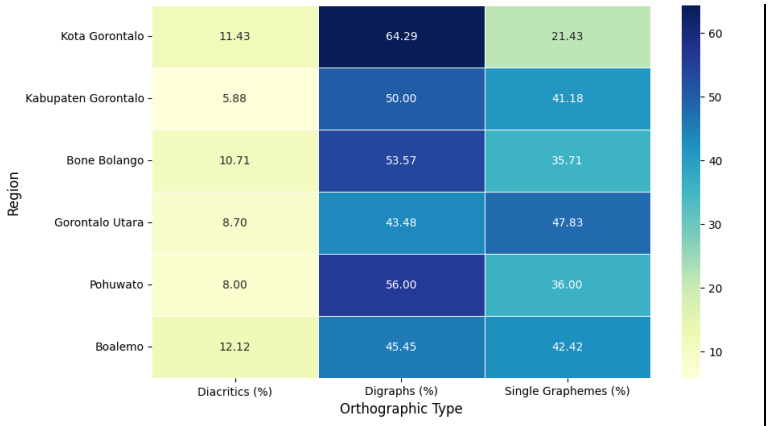

Figure 2. The Heatmap of Orthographic Practice by Region

The heatmap in Figure 2 emphasizes the orthographic variations across different regions. Darker shades in Gorontalo City highlight the dominance of digraphs, while North Gorontalo exhibits a high intensity of single grapheme usage. Regions such as Bone Bolango and Pohuwato display a more balanced distribution between digraphs and single graphemes, reflecting transitional areas that strive to integrate modernity with local traditions. This analysis aligns with Fishman's (2001) theory, which asserts that language patterns reflect the interaction between sociocultural dynamics and technological changes.

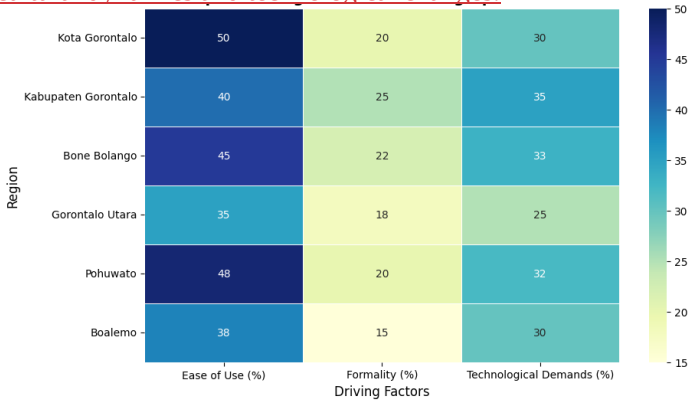

Figure 3. Heatmap of Driving Factors for Orthographic Preferences

The heatmap in Figure 3 illustrates the primary reasons behind

orthographic choices across different regions. Gorontalo City stands out with "ease of use" as the dominant factor (50%), aligning with the demand for fast communication in digital spaces (Baron, 2020; Tagg & Seargeant, 2021). In contrast, the "more formal" factor is more prominent in semi-urban areas such as Gorontalo Regency (25%), reflecting the need to adapt orthographic practices to educational or official documentation contexts. Rural areas like North Gorontalo indicate that the "technological demand" factor has less influence compared to urban regions, consistent with limited access to technology in these areas.

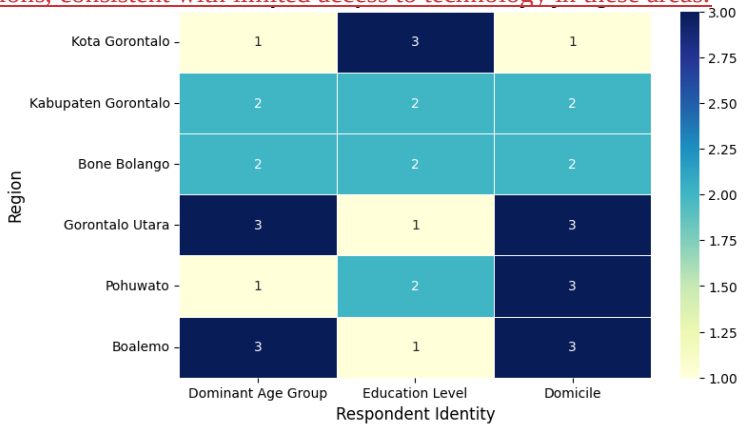

Figure 4. Heatmap of Respondent Identity by Region

The heatmap in Figure 4 provides insights into the social characteristics underlying orthographic preferences. Gorontalo City, dominated by a younger generation with higher education levels and urban residence, tends to favor digraphs as a symbol of modernity. Conversely, rural areas such as Boalemo and North Gorontalo, characterized by older generations with lower education levels and rural residence, prefer single graphemes to preserve traditional patterns. These findings align with Pauwels' (2016) theory, which posits that language and orthographic choices often reflect cultural identity.

The visualization illustrates that Gorontalo's orthographic preferences are shaped by the interaction between tradition, modernization, and social dynamics. Urban areas, such as Gorontalo City, exhibit high adoption of digraphs, driven by efficiency needs and the influence of digital technology. In contrast, rural areas like North Gorontalo maintain single

graphemes as part of oral traditions, reflecting a strong cultural identity. These findings highlight the importance of understanding the social and cultural context when analyzing language patterns. As noted by Crystal (2010) and Anderson and Harrison (2022), modernization does not entirely replace tradition but creates a hybridization of communication patterns. The results have significant implications for educational policies and cultural preservation, particularly in maintaining a balance between technology and tradition amid dynamic social changes.

3.2 The Relationship Between Social Context and Orthographic Preferences

The orthographic preferences of Gorontalo communities reflect the complex sociocultural dynamics deeply embedded in their social context. Orthographic patterns, such as digraphs, single graphemes, and diacritics, not only fulfill practical needs for communication but also illustrate how communities negotiate between modernity and tradition. On one hand, urban areas and social media promote more flexible and efficient orthographic patterns, such as digraphs, to facilitate rapid, technology-based communication. On the other hand, oral traditions and rural regions preserve more traditional patterns, such as single graphemes, which are closely tied to verbal practices and local cultural values (Crystal, 2010; Finnegan, 2012).

Previous studies indicate that modernization often drives shifts in communication patterns, particularly in the context of urbanization and the penetration of digital media (Labov, 2006; Herring, Stein, & Virtanen, 2013). However, in communities rooted in oral traditions, suprasegmental elements such as intonation, rhythm, and stress remain dominant factors in maintaining simple yet meaningful communication patterns (Duranti, 1997; Ladefoged & Johnson, 2015).

This study aims to uncover how differing social contexts influence the orthographic preferences of Gorontalo communities. The following data visualizations provide a detailed depiction of the distribution of orthographic preferences across various social contexts, including social media, urban and rural areas, and oral traditions.

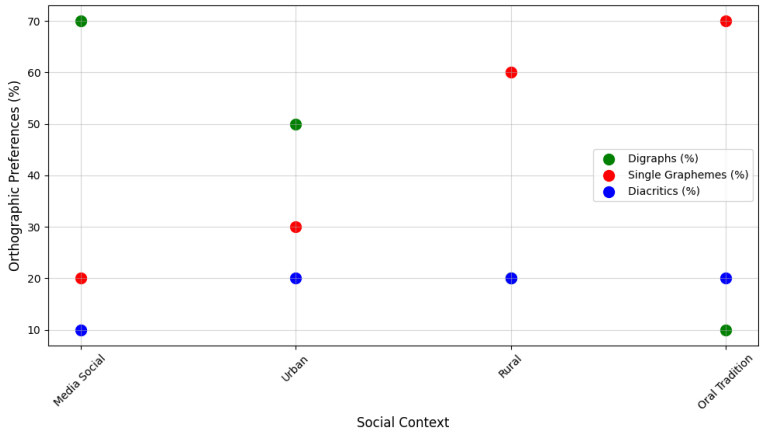

Figure 5. Scatter Plot: Relationship between Social Context and Orthographic Preferences

The distribution of orthographic preferences, as depicted in Figure 5, reveals a clear relationship between social context and the written communication patterns of Gorontalo communities. Within oral traditions, single graphemes dominate with a proportion of 70%, reflecting the importance of suprasegmental elements in preserving message integrity and meaning, particularly in religious texts, folklore, and traditional rituals (Finnegan, 2012; Yule, 2020). Writing in this context functions as a complement to verbal communication rather than as a replacement or primary medium. Digraphs account for only 10% due to their limited relevance in culturally rooted communication, while diacritics (20%) play a significant role in emphasizing meaning in formal or religious texts.

In rural areas, which remain heavily reliant on oral traditions, a similar pattern is observed, with single graphemes still dominant at 60%. Suprasegmental elements such as intonation and stress continue to influence societal perceptions of writing as a tool that complements verbal communication. Folklore and religious texts, often employing rich verbal communication, make single graphemes more relevant than other patterns. Conversely, digraphs (20%) and diacritics (20%) play more limited roles as they are less aligned with the needs of conservative rural communities (Ong, 2012; Crystal, 2010).

In urban areas, modernization begins to shape more complex and balanced communication patterns. Digraphs dominate at 50%, reflecting

the need for efficiency in written communication, particularly in digital technology contexts (Herring, Stein, & Virtanen, 2013; Fishman, 2001). However, single graphemes (30%) and diacritics (20%) remain relevant, particularly in formal domains such as education and official documents. Urbanization introduces a pluralistic interaction between tradition and modernity, where traditional elements are preserved even as the influence of technology grows (Labov, 2006).

In the context of social media, digraphs have the highest usage proportion at 70%, consistent with the platform's emphasis on efficiency and speed in communication. Single graphemes are used at 20%, while diacritics account for 10%, reflecting a shift in orthographic preferences entirely focused on the practical needs of technology-based communication. Social media, as an informal communication space, demonstrates that the suprasegmental elements dominant in oral traditions hold little relevance in digital contexts (Duranti, 1997; Crystal, 2010).

These findings confirm significant differences in orthographic preferences based on the social contexts of Gorontalo. Oral traditions and rural areas maintain single graphemes as the dominant pattern, supported by the strong role of suprasegmental elements in sustaining local cultural continuity. Conversely, urban areas and social media show a preference for digraphs, reflecting the influence of modernization and technology in shaping more flexible and efficient communication patterns.

This study supports the view that tradition and modernity can coexist when a balance is maintained between preserving cultural identity and adapting to social change (Fishman, 2001; Yule, 2020). Although modernity continues to progress, these findings demonstrate that oral traditions remain a vital foundation for Gorontalo communities in navigating complex social dynamics. Orthographic choices not only reflect practical needs but also serve as symbols of cultural adaptation, preserving traditional roots amidst the tides of technological and global changes.

3.3 The Relationship Between Education and Orthographic Preferences

The orthographic preferences of Gorontalo communities are closely tied to education levels, reflecting not only practical needs in acquiring written language but also the sociocultural dynamics that shape communication patterns. Orthographic forms such as digraphs, single graphemes, and diacritics are utilized differently across educational stages, illustrating a shift between the need for efficiency, local traditions,

and formal precision. Education serves not only as a means of language acquisition but also as a medium that bridges local traditions and modernization, as evidenced by the evolving orthographic preferences across different educational levels (Crystal, 2010; Yule, 2020).

At early educational stages, such as primary school, writing practices focus more on simple comprehension for practical communication. In contrast, at higher levels of education, the need for more formal and complex orthographic forms begins to emerge. This pattern demonstrates that education not only imparts technical writing skills but also shapes how students understand culture and tradition through written language (Finnegan, 2012; Ong, 2012). To visually capture these dynamics, the following scatter plot illustrates the distribution of orthographic preferences across educational levels in Gorontalo.

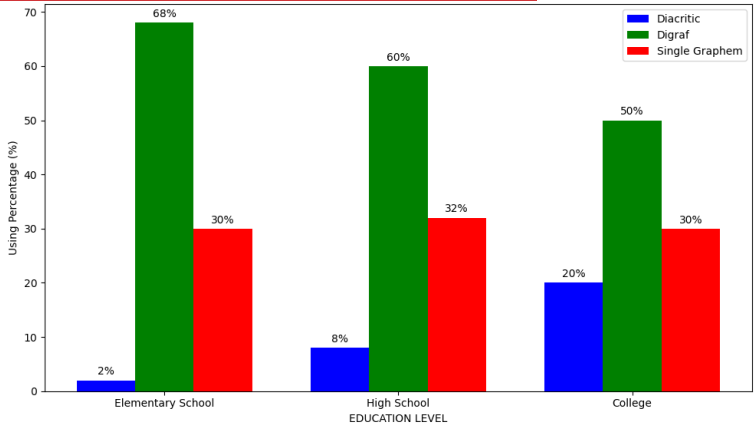

Figure 6. The Comparison among Education Level and Orthographic Preferences in Gorontalo

The data visualization in Figure 6 reveals the distribution of orthographic preferences, illustrating the relationship between educational levels and the use of digraphs, single graphemes, and diacritics. At the primary school level, digraphs dominate with 68%, while single graphemes account for 30%, and diacritics only 2%. The dominance of digraphs reflects an early education approach emphasizing simplicity and efficiency in the learning process. Digraphs are more accessible to primary school students due to their straightforward nature, supporting foundational literacy skills in reading and writing. Meanwhile, the

minimal use of diacritics indicates that linguistic formality is not a primary focus at this stage (Crystal, 2010; Ladefoged & Johnson, 2015).

At the secondary school level, while digraphs remain dominant at 60%, there is an increase in the use of single graphemes to 32% and diacritics to 8%. This pattern suggests that secondary education begins to introduce students to more complex and formal orthographic usage. The rising use of single graphemes may reflect the influence of local traditions, as this pattern is often associated with simplicity and cultural proximity, particularly in religious texts and traditional literature (Finnegan, 2012; Ong, 2012). Conversely, the increased use of diacritics at this level indicates growing exposure to linguistic precision, especially in academic contexts or documents requiring formal expression.

At the higher education level, there is a significant shift in orthographic preferences. Digraphs decline to 50%, while single graphemes remain stable at 30%, and diacritics rise to 20%. This shift suggests that higher education emphasizes precision and formality in written communication. Diacritics become more relevant at this stage, particularly in academic or professional contexts where accuracy and detail are paramount. Meanwhile, digraphs, though still dominant, begin to decline as they do not always align with the demands of more formal communication. The stability of single grapheme usage across educational levels reflects the enduring influence of tradition, even as modernization continues to exert its impact (Labov, 2006; Duranti, 1997).

Orthographic preferences in Gorontalo reflect a complex interplay between educational levels, local traditions, and modernization. At the primary education level, the dominance of digraphs represents the need to simplify early learning, while at secondary and higher education levels, the demand for formality and precision increases, as evidenced by the growing use of diacritics. The consistent use of single graphemes across all educational stages underscores the importance of tradition in shaping the cultural identity of Gorontalo communities.

These findings support the view that education plays a vital role as a bridge between tradition and modernity. Education not only shapes students' technical writing abilities but also influences their perceptions of tradition and formality in written communication. In the context of Gorontalo society, education functions not only as a tool for modernization but also as a medium for preserving local cultural values, ensuring that shifts in communication patterns do not erase key elements of the community's identity (Crystal, 2010; Yule, 2020; Finnegan, 2012;

Herring, Stein, & Virtanen, 2013).

3.4 Technological Implications for Orthographic Choices

The adoption of technology in Gorontalo communities demonstrates significant variations based on geographical location and social context. These patterns reflect the dynamics between modernity and tradition, where modern technologies such as social media and digital devices are more widely accepted in urban areas, while simpler technologies remain relevant in rural regions. These variations are not only influenced by generational preferences but are also shaped by technology accessibility, social needs, and levels of urbanization (Crystal, 2010; Fishman, 2001).

Key orthographic tools, such as keyboards, keypads, and touchscreens on digital devices, play a crucial role in shaping orthographic practices in Gorontalo. In the context of digital technology, these features influence the efficiency and ease of using various orthographic methods. This suggests that technological infrastructure is a critical factor in shaping how communities adapt to specific orthographic systems.

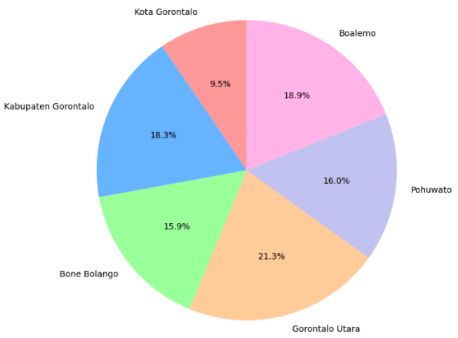

Figure 7. Proportion of Respondents who Mentioned Technology as a Barrier

The pie chart in Figure 7 illustrates variations in perceptions of technology across six regions in Gorontalo. Rural areas, such as North Gorontalo (21.3%) and Boalemo (18.9%), have the highest percentage of respondents perceiving technology as a barrier. This indicates that limited technological infrastructure, low digital literacy, and inadequate training in using digital devices are significant challenges in these regions (Ong, 2012; Finnegan, 2012). These barriers make it more difficult for rural

communities to adopt modern technologies, resulting in a continued preference for simpler orthographic methods, such as single graphemes.

In contrast, Gorontalo City has the lowest percentage of respondents (9.5%) viewing technology as a hindrance. Higher rates of technology adaptation in urban areas are supported by better access to digital devices, higher levels of education, and greater exposure to social media. This pattern aligns with the findings of Herring, Stein, and Virtanen (2021), which demonstrate that adequate technological infrastructure fosters efficiency and flexibility in digital communication.

The variation in perceptions of technology across Gorontalo reflects the strong relationship between technological accessibility, infrastructure conditions, and sociocultural dynamics. In rural areas, technological barriers are more pronounced, sustaining traditional orthographic methods. Conversely, in urban areas like Gorontalo City, higher technological adaptation enables the use of more efficient methods, such as digraphs, in digital communication.

This analysis underscores the importance of improving technological access and digital literacy in rural areas to bridge the technological divide between regions. Moreover, these findings support the perspectives of Crystal (2010) and Pauwels (2016), who argue that technological modernization does not necessarily replace tradition but instead creates adaptive patterns influenced by local sociocultural contexts.

These results are consistent with global patterns, where urban regions tend to adopt technology more quickly due to advanced infrastructure and better access to education (Labov, 2006). Conversely, rural areas, such as North Gorontalo and Boalemo, are often slower to integrate technology due to structural barriers, including high costs and limited resources (Duranti, 1997; Fishman, 2001).

The accompanying scatter plot visualizes the relationship between technological exposure and orthographic preferences, mapping the interaction of location and generational indicators. This scatter plot provides a quantitative perspective on how specific combinations of variables influence orthographic adaptation across different contexts.

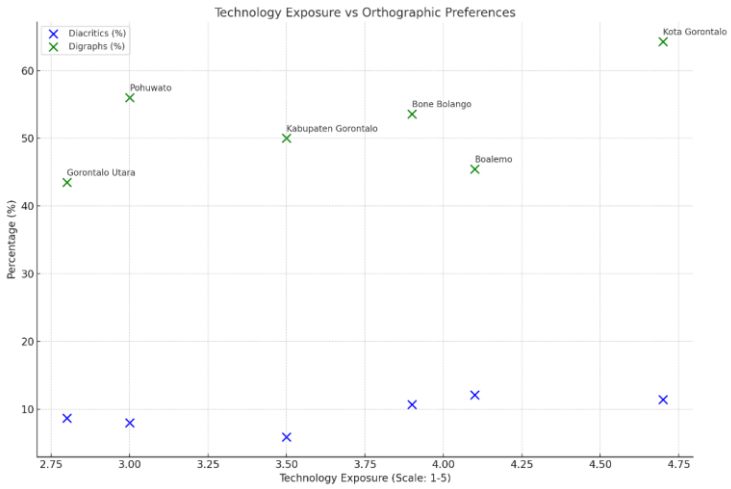

Figure 8. relationship between technological exposure and orthographic preferences

The scatter plot in Figure 8 provides a detailed perspective on the relevance of technology across different regions. The data reveal that areas with high technological exposure, such as Gorontalo City, show a strong preference for modern technology, as indicated by the dominance of digraphs (60%) as the primary orthographic pattern. This reflects the urban youth's demand for efficiency in technology-based communication (Herring, Stein, & Virtanen, 2013). In contrast, regions such as North Gorontalo and Pohuwato, with lower technological exposure, are more inclined to maintain single graphemes as their main orthographic pattern, highlighting an attachment to tradition and limited access to technology.

The scatter plot also illustrates the relationship between generational relevance and social context. The range of relevance values (Y-axis) indicates that lower values (0–1) are predominantly found in rural areas, where technology is perceived as less relevant for younger generations. For instance, simpler technologies referred to as "rural technologies" dominate in regions like Pohuwato and North Gorontalo. Conversely, higher relevance values (3–5) are observed in urban areas such as Gorontalo City and Gorontalo Regency, where indicators like "social media" and "practicality" align more closely with the needs of the younger generation (Crystal, 2010; Duranti, 1997).

Additionally, the scatter plot highlights transitional regions such as Bone Bolango. This area demonstrates high relevance to mobile technologies (Y = 3–4), reflecting an adaptation phase where traditional elements persist, but modern technology adoption is increasing. Boalemo, on the other hand, shows the highest relevance (Y = 5) for the "practicality" indicator, indicating a strong demand for efficiency among the younger generation (Ong, 2012).

These visualizations complement one another in explaining the relationship between technological exposure, orthographic preferences, and perceptions of technological barriers in Gorontalo. The pie chart reveals that regions with high perceptions of technological barriers tend to have low technological exposure and maintain traditional patterns, as seen in North Gorontalo and Boalemo. In contrast, the scatter plot indicates that regions with high technological exposure, such as Gorontalo City, favor modern patterns like digraphs.

This data confirms that technological exposure acts as a catalyst in shaping orthographic preferences, but the success of technology adoption heavily depends on social factors such as infrastructure, digital literacy, and local cultural values (Herring, Stein, & Virtanen, 2013; Fishman, 2001). While modernization drives technological adoption in urban areas, tradition continues to play a significant role in rural regions, particularly in sustaining patterns such as single graphemes.

These findings highlight how technology adoption in Gorontalo is influenced by the interplay of technological exposure, generational relevance, and social context. Urban areas like Gorontalo City exhibit more progressive technology adoption, with a strong preference for modern orthographic patterns like digraphs. Conversely, rural areas like North Gorontalo and Boalemo tend to preserve traditional patterns, reflecting cultural resistance to rapid technological modernization.

By combining quantitative and qualitative perspectives, this analysis provides deep insights into the technological divide between urban and rural areas. This approach not only maps the data distribution but also uncovers the social contexts underpinning these patterns. These findings offer a foundation for policy development aimed at reducing technological disparities, considering local needs and the potential for transitioning to modern technologies across Gorontalo's regions.

~~4. Results~~

~~4.1 Usage of Colon Diacritic~~

This study investigated the distribution of long vowel usage represented with a colon diacritic (u:) across different regions of Gorontalo. Table 1 shows the number of respondents who use colon diacritic to mark long vowels in six regions, alongside the total number of respondents in each region.

Table 1. Distribution of Long Vowel Representation Using Colon Diacritic by Region

Region	Respondents Using Colon Diacritic	Total Respondents	Percentage (%)
Kota Gorontalo	8	70	11.43%
Kabupaten Gorontalo	2	34	5.88%
Bone Bolango	3	28	10.71%
Gorontalo Utara	2	23	8.70%
Pohuwato	2	25	8.00%
Boalemo	4	33	12.12%

1. Overall Trends

The results indicate that the use of colon diacritic (u:) for long vowel representation is relatively low across the surveyed regions, with an average usage rate below 12.5%. Boalemo has the highest percentage of respondents using the diacritic at 12.12%, followed closely by Kota Gorontalo with 11.43%. On the other hand, Kabupaten Gorontalo reported the lowest usage, with only 5.88% of respondents utilizing this orthographic marker.

2. Variation Between Regions

a. Kota Gorontalo, being one of the most urbanized regions, shows a higher adoption of colon diacritic use compared to more rural areas like Kabupaten Gorontalo and Pohuwato. This suggests that respondents in urban areas may have better exposure to or understanding of formal orthographic conventions.
b. Boalemo stands out with the highest adoption rate (12.12%), which could indicate a localized orthographic preference or influence from educational or cultural practices specific to the region.

c. Bone Bolango also shows relatively higher usage (10.71%) compared to other regions, although still below the national average of long vowel usage with diacritics.

3. Regions with Lower Usage

Regions such as Kabupaten Gorontalo and Pohuwato show the least adoption of colon diacritics, with percentages of 5.88% and 8.00% respectively. These low figures may indicate a lack of standard orthographic education or preference for simpler forms of long vowel representation, such as digraphs or unmarked vowels.

4. Implications

The findings reveal that while the colon diacritic is used to some extent in Gorontalo, it has not yet become a widely accepted standard across all regions. This may be due to varying levels of orthographic awareness or educational access in different regions. The higher usage in Boalemo and Kota Gorontalo suggests that regional factors—such as access to formal education or urbanization—may influence the adoption of formal orthographic practices.

4.2 Usage of Macron Diacritic

This section extends the investigation into the use of macron diacritic (ū) for marking long vowels in several regions of Gorontalo. Table 2 displays the number of respondents who use the macron diacritic for long vowel representation, alongside the total number of respondents in each region.

Table 2. Distribution of Long Vowel Representation Using Macron Diacritic by Region

Region	Respondents Using Macron Diacritic	Total Respondents	Percentage (%)
Kota Gorontalo	0	70	0.00%
Kabupaten Gorontalo	1	34	2.94%
Bone Bolango	0	28	0.00%
Gorontalo Utara	0	23	0.00%
Pohuwato	0	25	0.00%
Boalemo	0	33	0.00%

1. Overall Trends

The results show very low adoption of the macron diacritic for long vowel representation. Out of all the regions surveyed, only Kabupaten Gorontalo reported any use of the macron diacritic, with just 1 respondent (2.94%) utilizing it. In all other regions, no respondents reported using this diacritic.

2. Variation Between Regions

a. Kota Gorontalo, Bone Bolango, Gorontalo Utara, Pohuwato, and Boalemo reported 0% usage of the macron diacritic. This indicates that the use of this diacritic is not widespread and may not be part of the accepted orthographic conventions in these regions.
b. Kabupaten Gorontalo stands out as the only region where the macron diacritic was reported, albeit by a very small percentage of respondents (2.94%). This suggests that there may be limited localized knowledge or experimentation with the use of macrons in this region.

3. Implications

The near-complete absence of the macron diacritic in long vowel representation suggests that this diacritic has not been integrated into the orthographic practices of the majority of Gorontalo's population. The lack of usage across most regions may reflect either a lack of awareness of the macron diacritic or a preference for other methods of long vowel representation, such as digraphs or colon diacritic (u:). The isolated use in Kabupaten Gorontalo may indicate early attempts to adopt more formal orthographic conventions, but this has not yet spread to the wider population.

4. Educational and Cultural Considerations

The limited use of the macron diacritic highlights a potential gap in orthographic standardization and education regarding formal diacritical marks in Gorontalo. In regions where macron usage is virtually non-existent, efforts to raise awareness or formalize such conventions could be beneficial, particularly in academic or formal settings where precise phonological representation is required. However, the general preference for simpler writing forms without diacritic markers might also indicate

cultural preferences for less complex orthographic systems.

4.3 Usage of Single Grapheme

This section provides findings on the usage of single grapheme to represent long vowels across the surveyed regions in Gorontalo. Table 3 outlines the number of respondents who utilize single graphemes (e.g., "u" or "a" without diacritics or digraphs) for long vowel representation.

Table 3. Distribution of Long Vowel Representation Using Single Grapheme by Region

Region	Respondents Using Single Grapheme	Total Respondents	Percentage (%)
Kota Gorontalo	15	70	21.43%
Kabupaten Gorontalo	14	34	41.18%
Bone Bolango	10	28	35.71%
Gorontalo Utara	11	23	47.83%
Pohuwato	9	25	36.00%
Boalemo	14	33	42.42%

1. Overall Trends

The results indicate a moderate to high adoption of the single grapheme method to represent long vowels across the surveyed regions. Gorontalo Utara shows the highest usage rate, with 47.83% of respondents using single graphemes, followed closely by Boalemo (42.42%) and Kabupaten Gorontalo (41.18%). Kota Gorontalo has the lowest adoption rate, with 21.43% of respondents using single graphemes.

2. Variation Between Regions

a. Gorontalo Utara has the highest proportion of respondents using single graphemes (47.83%), indicating a strong preference for this method in the region. This suggests that the orthographic tradition here may prioritize simpler representations without the use of diacritics or digraphs.
b. Boalemo and Kabupaten Gorontalo both show similar trends with over 40% of respondents adopting single grapheme usage, suggesting that the simplification of vowel representation is prevalent in these regions.

c. Kota Gorontalo, the most urbanized region, has the lowest usage rate (21.43%), which may indicate a higher awareness or preference for using more complex orthographic systems like diacritics or digraphs to represent long vowels.

3. Implications

The data show that single grapheme representation is quite common, with several regions reporting adoption rates exceeding 40%. This suggests a general preference for minimalist orthographic systems in certain regions of Gorontalo, where long vowels are represented with a single grapheme rather than with diacritics or digraphs.

This trend could be influenced by the informality of spoken and written language in rural regions, where complex orthographic systems might not be widely taught or used. On the other hand, in Kota Gorontalo, where the usage rate is the lowest, respondents may have access to more formalized education that encourages the use of digraphs or diacritics.

4. Educational and Cultural Factors

The widespread use of single grapheme representation suggests that there is a cultural and educational preference for simpler writing forms in many regions. This could be driven by practical reasons, such as the ease of use in informal communication and the limited need for formalized vowel marking in daily language use.

However, in regions like Kota Gorontalo, where usage of single graphemes is lower, it is possible that more standardized orthographic conventions are being promoted, particularly in academic or formal writing settings. This difference between regions may reflect varying levels of education and exposure to formalized orthographic practices.

4.4 Usage of Diagraphs

This section examines the usage of digraphs (such as "aa" or "uu") for long vowel representation in different regions of Gorontalo. Table 4 displays the number of respondents who utilize digraphs to represent long vowels, alongside the total number of respondents and their percentage within each region.

Table 4. Distribution of Long Vowel Representation Using Digraph by Region

Region	Respondents Using Digraph	Total Respondents	Percentage (%)
Kota Gorontalo	45	70	64.29%
Kabupaten Gorontalo	17	34	50.00%
Bone Bolango	15	28	53.57%
Gorontalo Utara	10	23	43.48%
Pohuwato	14	25	56.00%
Boalemo	15	33	45.45%

1. Overall Trends

The results show that the use of digraphs is quite prevalent across all regions surveyed, with Kota Gorontalo showing the highest adoption rate at 64.29%. The overall range of usage falls between 43.48% (Gorontalo Utara) and 64.29% (Kota Gorontalo), indicating a fairly high adoption rate across regions.

2. Variation Between Regions

a. Kota Gorontalo reports the highest usage of digraphs (64.29%), suggesting a strong preference for digraph-based representation of long vowels. This could be attributed to urbanization and higher levels of formal education that promote standard orthographic practices.
b. Pohuwato and Bone Bolango follow with significant percentages of 56.00% and 53.57% respectively, showing that digraphs are a popular method of long vowel representation in these regions as well.
c. Kabupaten Gorontalo and Boalemo also show relatively high usage, with 50.00% and 45.45% of respondents respectively using digraphs. These figures are close to the regional average.
d. Gorontalo Utara, with 43.48%, has the lowest percentage of respondents using digraphs. However, this is still a substantial proportion, indicating that digraphs are fairly common even in this region.

3. Implications

The high percentage of digraph use across regions suggests that digraphs are a well-established method of representing long vowels in Gorontalo. This reflects a widespread orthographic convention that aligns with formal writing practices in both urban and rural areas. Digraphs are

particularly effective in simplifying vowel length representation without relying on diacritics or more complex orthographic markers, making them accessible and easy to use for both formal and informal communication.

4. Educational and Cultural Considerations

The widespread adoption of digraphs indicates that this method is likely well-accepted in educational contexts and may be reinforced through school curricula. The consistent use of digraphs across different regions reflects a degree of standardization that could be further reinforced through formal education and language documentation efforts.

However, there may still be regional differences in the understanding or adoption of formalized writing systems, particularly in regions like Gorontalo Utara and Boalemo, where the usage of digraphs is lower compared to Kota Gorontalo. Targeted educational programs focusing on orthographic consistency may be beneficial in these regions to promote a more uniform approach to vowel representation.

4.5 Usage of Arabic Pegon Script

This section presents findings on the usage of Arabic Pegon script for writing in various regions of Gorontalo. Table 5 illustrates the number of respondents who reported using the Arabic Pegon script, alongside the total number of respondents and their percentage in each region.

Table 5. Distribution of Arabic Pegon Script Usage by Region

Region	Respondents Using Arabic Pegon Script	Total Respondents	Percentage (%)
Kota Gorontalo	2	70	2.86%
Kabupaten Gorontalo	0	34	0.00%
Bone Bolango	0	28	0.00%
Gorontalo Utara	0	23	0.00%
Pohuwato	0	25	0.00%
Boalemo	0	33	0.00%

1. Overall Trends

The data shows very low usage of the Arabic Pegon script for writing across all regions surveyed. The only region where any usage is reported

is Kota Gorontalo, with 2 respondents (2.86%). In all other regions – Kabupaten Gorontalo, Bone Bolango, Gorontalo Utara, Pohuwato, and Boalemo – there are 0% respondents who use the Arabic Pegon script.

2. Variation Between Regions

a. Kota Gorontalo stands out as the only region where the Arabic Pegon script is used at all, with a very small percentage of 2.86% of respondents. This likely reflects the urban nature of Kota Gorontalo, where respondents may have more exposure to different writing systems, including traditional ones like Arabic Pegon.
b. In all other regions, no respondents reported using the Arabic Pegon script, indicating that it is not a prevalent form of writing in Kabupaten Gorontalo, Bone Bolango, Gorontalo Utara, Pohuwato, or Boalemo. This suggests that either the script is not widely known or that it has fallen out of general use in these regions.

3. Implications

The low usage of Arabic Pegon script across all surveyed regions implies that this traditional script may no longer be in active use for writing in Gorontalo, especially outside Kota Gorontalo. Even in Kota Gorontalo, where 2 respondents reported using the script, the adoption rate remains extremely low (2.86%).

The limited use of Arabic Pegon could reflect a shift towards Latin-based writing systems, which are more commonly used in both formal education and daily communication. This trend away from Arabic Pegon may indicate the decline of traditional writing systems, which were historically significant but may now be restricted to niche or ceremonial use.

4. Educational and Cultural Considerations

The decline in the use of Arabic Pegon script highlights the need for cultural preservation efforts if there is a desire to maintain knowledge of this traditional script. Educational initiatives that reintroduce Arabic Pegon in cultural studies or heritage education could help revitalize interest in this script, especially in urban areas like Kota Gorontalo where there is still some familiarity with it.

Additionally, documentation efforts may be necessary to ensure that the

~~knowledge of Arabic Pegon does not disappear entirely. Programs that combine language preservation with cultural heritage such as me'eraji manuscript could be beneficial in retaining the historical significance of this script in the Gorontalo region for Arab Pegon as the second orthography in Gorontalo writing system.~~

4. Discussion

4.1 Socio-Cultural Dimensions: Orthography as a Marker of Identity

The orthographic choices of Gorontalo communities reveal a close relationship between cultural practices and identity formation. Rural areas like North Gorontalo exhibit a dominance of single graphemes, reflecting oral traditions that prioritize suprasegmental elements such as intonation and stress over complex visual representations in writing. This underscores the role of orthography as a tool for preserving local cultural heritage, where writing serves as a supplementary rather than primary medium for communication (Finnegan, 2012; Ong, 2012).

The use of single graphemes aligns with findings by Chebanne (2015) on Khoisan communities in Botswana, where simplified orthography helps sustain cultural identity amid marginalization. In Gorontalo, this choice similarly reflects resistance to modern pressures, as highlighted by Villa and Vosters (2015), who argue that orthography often becomes an ideological battleground for preserving local values against global dominance.

In contrast, urban areas like Gorontalo City exhibit a preference for digraphs, symbolizing efficiency and adaptation to modernity. As noted in Hillewaert's (2015) study on social media, the use of digraphs reflects not only communicative functionality but also social identity, showcasing connectivity with digital technology. Globally, this shift illustrates urban communities' efforts to negotiate a modern identity while maintaining respect for cultural roots.

4.2 Technology and Orthographic Transformation

Technology serves as a major catalyst for changing orthographic patterns in urban Gorontalo. The preference for digraphs in digital environments reflects how tools like keyboards and touchscreens promoted efficient communication. Herring, Stein, and Virtanen's (2021) study highlights that digitalization often influences societies to prioritize methods of communication that are faster and easier to comprehend.

However, technology also reveals adoption disparities in rural areas. Higher perceptions of technological barriers in North Gorontalo and

Boalemo reflect uneven access to technology. This factor reinforces the dominance of simple single graphemes, which better align with technological limitations in these regions (Mlambo, 2024; Dayanand, 2023). Here, technology becomes not only a tool for transformation but also a symbol of social and geographical inequalities.

Nevertheless, the potential of technology to support cultural preservation cannot be overlooked. Weber et al.'s (2023) study on Blackfoot Words demonstrates how digital platforms can archive local languages and support community literacy. A similar approach could be applied in Gorontalo, leveraging technology to document oral traditions and strengthen single grapheme practices as part of local cultural preservation.

4.3 Education as a Bridge Between Tradition and Modernity

Education serves as a crucial arena for bridging the gap between tradition and modernity. The use of diacritics in formal institutions reflects efforts to maintain formality in written communication. However, data indicate that diacritics are used less frequently than digraphs or single graphemes, suggesting their limited functionality outside educational contexts.

This case parallels Dubost et al.'s (2019) findings on the Hmong community in Laos, where successful orthographic reforms involved local community engagement to create culturally relevant and functional systems. In Gorontalo, integrating local elements into the educational curriculum could enhance the relevance of formal orthography, such as diacritics, while addressing the needs of rural communities that prioritize single graphemes.

Additionally, research by Majorano et al. (2021) highlights that orthographic consistency plays a vital role in supporting literacy. Education can be a strategic tool for improving literacy in Gorontalo through community-based approaches that merge local traditions with modern technology. For example, educational programs that promote digraph use in urban areas and single graphemes in rural areas could bridge these gaps effectively.

4.4 Global Reflection: Social, Technological, and Policy Implications

The findings from Gorontalo illustrate how orthography functions as both a tool for cultural preservation and a symbol of modernity, aligning with global trends. Chebanne's (2015) study on African communities shows that simplified orthography can serve as a means of preserving tradition amid marginalization, while Hillewaert (2015) highlights the role of modern orthography in constructing identity within digital spaces.

In the context of Gorontalo, technology has the potential to simultaneously support cultural preservation and enhance communication efficiency. As suggested by Mlambo (2024) and Weber et al. (2023), digitalization can be an inclusive tool for improving literacy in rural areas without compromising traditional values. However, literacy policies must be designed to address technological disparities and ensure that local needs remain a priority.

Community involvement in orthographic development also emerges as a key factor for success, as demonstrated by Dondelewski and Czopek (2022). Similar initiatives in Gorontalo could include community-based programs to support the use of single graphemes and digraphs, reflecting local needs while reinforcing cultural identity.

5. Discussion

The results presented in the previous section highlight significant variation in the orthographic practices of vowel length representation and the usage of Arabic Pegon script in Gorontalo. This discussion delves into these findings, analyzing the implications of different methods of vowel representation—diacritic colon (u:), macron (ū), digraphs, and single grapheme—as well as the usage of Arabic Pegon script. Each method's impact on linguistic standardization, cultural preservation, and educational practices is examined in detail.

5.1 Usage of Diacritics (Colon and Macron)

The findings indicate that the use of diacritic colon (u:) for long vowel representation is relatively low across Gorontalo, with the highest adoption rate in Boalemo (12.12%) and the lowest in Kabupaten Gorontalo (5.88%). Similarly, the use of macron (ū) is almost non-existent, with Kabupaten Gorontalo being the only region where its usage was recorded (2.94%). This indicates a general lack of awareness or preference for these formalized orthographic markers among the population.

The limited use of diacritics might be attributed to pedagogical limitations or the fact that most speakers rely on contextual cues in spoken language rather than written markers to distinguish between long and short vowels. While diacritics offer precision in marking phonological distinctions, their limited adoption in Gorontalo suggests that there is insufficient emphasis on formal orthographic education at the local level (Anderson, 2005). Additionally, digital communication tools that do not easily support the use of diacritics might further discourage

their use, particularly among younger generations (Smith, 2016).

5.2 Preference for Digraphs

In contrast to diacritics, the use of digraphs (e.g., "aa" or "uu") is far more common, with Kota Gorontalo showing the highest adoption (64.29%) and Gorontalo Utara the lowest (43.48%). This widespread preference suggests that digraphs provide a simpler and more accessible solution for indicating vowel length, as they do not require specialized characters and are supported across all platforms (Walters, 2017).

The popularity of digraphs across regions may be linked to their use in informal communication and local educational practices. Given that digraphs are easier to implement in both digital and handwritten formats, they serve as a practical compromise between phonological accuracy and ease of use. However, the reliance on digraphs could contribute to regional orthographic variability, especially in areas with lower educational resources (Jones & Foster, 2011). To achieve linguistic standardization, educational efforts must focus on promoting consistent usage of digraphs while also introducing more formalized writing conventions in appropriate contexts.

5.3 Use of Single Grapheme

The adoption of single grapheme to represent long vowels without diacritic markers is also prevalent, particularly in Gorontalo Utara (47.83%) and Boalemo (42.42%). This trend reflects a preference for simplified orthographic practices in certain regions, where the phonological length of vowels is understood through context rather than explicit markers.

The use of single grapheme without diacritics aligns with findings in other low-resource language communities, where simplicity and ease of writing often take precedence over phonological precision (Brown, 2014). However, this practice can result in ambiguous interpretations of written language, particularly for non-native speakers or learners who are not familiar with the spoken language's nuances (Jones & Clark, 2015). Therefore, while single grapheme usage may be convenient for native speakers, it complicates language teaching and could hinder efforts to standardize the writing system across different dialects and regions (Smith & Walsh, 2018).

5.4 The Use of Arabic Pegon Script

~~The findings indicate that the use of Arabic Pegon script is largely absent across Gorontalo, with only 2 respondents in Kota Gorontalo (2.86%) reporting its use. This aligns with the general trend across Indonesia, where the Latin script has become dominant, relegating traditional scripts like Pegon to ceremonial or religious contexts (Yusuf, 2009).~~

~~The near-extinction of Pegon in writing suggests that cultural shifts and the introduction of formal education systems based on Latin script have contributed to the diminishing role of traditional scripts (Harris, 2013). Furthermore, the lack of Pegon usage highlights a broader cultural and linguistic displacement, as younger generations are less likely to learn or use the script (Anderson, 2015). Given the rich history of Pegon in the transmission of Islamic knowledge in Indonesia, its near-disappearance in Gorontalo raises questions about the future of cultural literacy and the preservation of traditional writing systems (Yusuf, 2012).~~

~~Efforts to revitalize Arabic Pegon in Gorontalo should consider targeted cultural preservation programs that integrate Pegon into religious education and local heritage initiatives (Anderson, 2015). This could help maintain its significance as a marker of cultural identity, even if its practical use in everyday writing continues to decline.~~

~~6. Conclusion~~

5. Conclusion

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The orthographic choices in Gorontalo reflect the dynamic interplay between cultural traditions and modernity, influenced significantly by socio-cultural, technological, and educational factors. Rural areas tend to retain single graphemes as a reflection of oral traditions that emphasize suprasegmental elements and collective cultural identity. Conversely, urban areas demonstrate a dominance of digraphs, highlighting adaptation to digital technology and the demand for communication efficiency.

Education plays a pivotal role in bridging this divide, with significant potential to integrate traditional elements and modern needs through community-based curricula. Technology, while a driver of orthographic transformation in urban areas, continues to face significant challenges in rural regions due to infrastructure limitations and low digital literacy.

Globally, these findings align with similar phenomena in other regions, such as Africa and Southeast Asia, where orthography serves as both a tool for cultural preservation and a symbol of modernity. The results contribute to broader discussions on the relationship between

orthography, identity, and social change, emphasizing the importance of community-based approaches in literacy development and orthographic policymaking.~~The results highlight a clear preference for digraphs over more formalized methods of vowel representation, such as diacritics or macron, and the limited use of Arabic Pegon suggests a significant shift towards Latin-based scripts. This suggests that while practical and accessible orthographic practices dominate everyday usage, they may hinder linguistic standardization and phonological accuracy. The findings call for targeted educational programs to promote consistent orthographic conventions, while also recognizing the role of cultural preservation efforts in maintaining traditional writing systems like Pegon.~~

6. Recommendations

Addressing the findings of this study requires strategic interventions that balance tradition, modernity, and local needs. One critical step is the enhancement of digital literacy in rural areas, where limited technological infrastructure and low digital literacy levels persist. Community-based digital literacy programs tailored to local contexts can serve as a bridge, incorporating region-specific orthographic practices to empower rural communities in adapting to modern communication demands. Alongside this, educational curricula should reflect a dual approach: integrating single graphemes as symbols of cultural identity for rural regions, while promoting digraphs in urban areas to align with technological efficiency and global communication trends.

Further, the development of digital tools holds immense potential in supporting both tradition and modernization. Local governments and cultural organizations could collaborate to create applications or platforms that document oral traditions and reinforce single grapheme practices. Such tools not only preserve cultural identity but also foster literacy and modern communication skills. Community engagement is essential in these efforts; by involving local stakeholders in the design and standardization of orthographic systems, policies and tools can remain culturally relevant and practical. Lastly, continued research into the intersection of technology, literacy, and cultural preservation is crucial. Future studies should evaluate the long-term effects of technology-driven literacy policies, especially in rural areas, and investigate the sustainability of integrating traditional orthographic practices into modern technological contexts.

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7. Limitations

Despite its contributions, this study has several limitations that should be acknowledged. The research's limited sample size and geographic coverage may constrain the generalizability of its findings to all regions of Gorontalo. Expanding the sample to include a broader demographic would provide more representative insights into orthographic preferences and practices. Furthermore, the study's focus on Gorontalo limits the applicability of its conclusions to other regions in Indonesia, underscoring the need for comparative studies across diverse linguistic and cultural contexts.

Another limitation is the absence of longitudinal data. This research provides a snapshot of orthographic preferences but does not examine how these preferences evolve over time in response to technological, educational, or sociocultural changes. Longitudinal studies could offer valuable insights into the sustainability of shifts in orthographic practices. Additionally, the lack of experimental approaches restricts the study's ability to measure the direct impact of interventions such as digital literacy training or community-based orthographic policies. Incorporating experimental designs in future research would help assess the effectiveness of specific strategies in transforming orthographic preferences.

Finally, while this study highlights the influence of technology on orthographic practices, it does not explore the role of specific technological tools, such as mobile applications or educational software, in shaping these practices. Addressing this gap in future research could provide a more nuanced understanding of the interplay between technology and orthography in Gorontalo and other similar contexts.

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Orthographic Representation of Long Vowels in Gorontalo: A Sociolinguistic Perspective on Tradition and Technology

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Abstract
This study examines the orthographic representation of long vowels in Gorontalo, focusing on the sociolinguistic interplay between tradition and technology. Data were collected from 213 respondents across six administrative regions using a mixed-methods approach to explore preferences for single graphemes, digraphs, and diacritics in varied sociocultural and technological contexts. The findings reveal distinct patterns: rural communities primarily retain single graphemes, reflecting oral traditions that emphasize suprasegmental features like rhythm and intonation. In contrast, urban areas adopt digraphs for their practicality in digital communication, while diacritics are predominantly confined to formal educational settings with minimal use in everyday contexts. Technology significantly shapes orthographic preferences, with digital tools promoting modern practices in urban areas, while technological limitations in rural regions sustain traditional systems. Education emerges as a pivotal factor, offering opportunities to reconcile local traditions with contemporary demands through community-based curricula. This study contributes to global discourses on orthographic representation, sociolinguistic identity, and the integration of tradition with technological advancements. The Gorontalo case illustrates how orthographic practices act as cultural artifacts, mediating identity and communication amid rapid social and technological change.
Keywords: Orthographic representation, long vowels, Gorontalo, sociolinguistics, digital communication

1. Introduction
Orthographic systems play a central role in supporting literacy, written

communication, and cultural preservation, particularly in the context of minority languages that are vulnerable to the pressures of modernization. As the visual representation of spoken language, orthography enables the relationship between graphemes and phonemes to be translated into consistent and meaningful written forms (Coulmas, 2003; Crystal, 2010). However, for minority languages such as Gorontalo, the challenge of developing a stable and relevant orthographic system remains a pressing issue. In particular, inconsistencies in orthographic representation, especially of long vowels, pose significant barriers to literacy and intergenerational comprehension.

Long vowels serve an essential phonemic function in Gorontalo, where their presence directly affects word meaning. For instance, the words *tu'o* (vomit) and *tuu'o* (hidden) illustrate how variations in vowel length produce substantial semantic differences. Yet, variability in writing practices—ranging from the use of diacritics, digraphs, or omission of vowel-length markers—frequently generates ambiguity, hindering literacy and reducing clarity in written communication (Ladefoged & Johnson, 2015).

This issue is not unique to Gorontalo. Similar challenges are observed in other minority languages worldwide. For example, in Botswana, orthographic inconsistencies in Khoisan languages have impeded literacy development and weakened cultural recognition (Chebanne, 2015). In Laos, community-based reforms of the Hmong language's orthography successfully established a culturally relevant and phonologically accurate writing system, significantly improving literacy (Dubost et al., 2019). Likewise, in Vietnam, orthographic reforms in the Cham language have demonstrated how accurate phonological representation can strengthen literacy while revitalizing cultural identity.

In Indonesia, orthographic inconsistencies extend beyond Gorontalo to other regional languages, including Sundanese, Bugis, and Minangkabau. Challenges in representing phonological elements, such as vowel length, create obstacles to literacy, particularly among younger generations who are more accustomed to the standardized orthography of Indonesian. For Gorontalo, this issue is exacerbated by the dominance of Indonesian as the national language, which has increasingly replaced many functions of Gorontalo in daily communication.

Socio-cultural dynamics also play a crucial role in shaping orthographic preferences among Gorontalo communities. Research indicates that orthographic conflicts often reflect underlying power hierarchies and

language ideologies within societies (Villa & Vosters, 2015). The dominance of Indonesian has not only accelerated the marginalization of Gorontalo but also created a disconnect between traditional practices and modern needs. Conversely, community-based approaches have proven effective in addressing such challenges. For example, Dondelewski and Czopek (2022) highlighted how local community involvement in orthographic reforms can strengthen a sense of ownership over the language and enhance consistency in writing systems.

Although substantial research has explored orthography in minority languages, most studies primarily focus on phonological and morphological descriptions, neglecting in-depth examination of socio-cultural and technological dimensions. Community-based approaches, successfully implemented in orthographic reforms for languages such as Maori in New Zealand and Khoisan in South Africa, have yet to be widely applied to Gorontalo (Chebanne, 2015; Smith & Walsh, 2018). Additionally, while advancements in digital tools such as local keyboards and AI-powered applications show significant potential to enhance orthographic consistency, their utilization remains minimal in the context of Gorontalo.

The Gorontalo language faces substantial challenges due to orthographic inconsistencies, particularly in the representation of long vowels. The ambiguity arising from varying writing practices poses significant barriers to literacy and written communication. Moreover, the absence of clear orthographic guidelines, limited technological support, and the dominance of Indonesian exacerbate these issues. A holistic approach is therefore required to bridge the gaps between linguistic needs, socio-cultural dynamics, and technological solutions for Gorontalo's writing system.

This study aims to examine the variations in the practice of writing long vowels across different regions of Gorontalo, with a particular focus on the distribution of graphemes, diacritics, and digraphs. Additionally, it seeks to analyze the influence of socio-cultural factors, such as local traditions and generational differences, on the orthographic preferences among Gorontalo communities. Another key objective is to evaluate the impact of digital tools, including localized keyboards and AI-based applications, in enhancing orthographic consistency and helping to preserve the Gorontalo language.

The study addresses three primary aspects. First, from a linguistic perspective, it examines variations in the practice of writing long vowels across Gorontalo. Second, it explores the socio-cultural dimensions of

orthographic preferences, considering traditional values, generational differences, and social contexts. Finally, from a technological standpoint, the study evaluates the potential of digital tools to support orthographic consistency and promote language preservation.

2. Methodology

2.1 Research Approach

This study employs a descriptive-exploratory approach with mixed methods, integrating quantitative and qualitative data to provide a comprehensive understanding of the distribution of long vowel orthography in Gorontalo, as well as the sociocultural influences and the impact of technology and education on orthographic consistency. This approach was chosen as it offers deeper insights than relying on a single method alone (Creswell, 2014; Tashakkori & Teddlie, 2010). The descriptive-exploratory design was used to examine existing orthographic patterns, while the mixed methods approach provided flexibility in combining statistical and thematic analyses (Yin, 2018; Flick, 2004).

2.2 Research Location and Participants

The research was conducted across six administrative regions in Gorontalo Province: Gorontalo City, Gorontalo Regency, Bone Bolango Regency, Boalemo Regency, Pohuwato Regency, and North Gorontalo Regency. These regions were selected to capture the social, cultural, and geographical diversity relevant to the distribution of orthographic practices. The participants comprised 213 individuals selected through purposive sampling, a method suitable for qualitative research as it allows the selection of participants with in-depth knowledge of the study topic (Neuman, 2014; Etikan et al., 2016). Participants included students, teachers, indigenous community members, and digital technology users to capture the dynamics of orthography across domains such as formal education, digital communication, and local cultural traditions (Israel & Hay, 2006).

2.3 Data Collection Procedures

Data were collected through surveys, semi-structured interviews, and focus group discussions (FGDs). Triangulation of data was employed to enhance the validity and reliability of the research findings by combining multiple methods and data sources (Denzin, 1978).

1. Survey
   The survey utilized structured questionnaires to document the distribution of long vowel orthographic practices, including diacritics, digraphs, and single graphemes. The survey provided quantitative data to capture general preferences across the six research locations (Bryman, 2016; Field, 2018).
2. Semi-Structured Interviews
   Semi-structured interviews were designed to delve deeper into the sociocultural factors influencing orthographic preferences in Gorontalo. They allowed participants to elaborate on their preferences and the role of technology and education in shaping their orthographic practices (Guest et al., 2012).
3. Focus Group Discussions (FGDs)
   FGDs were conducted to discuss the opportunities and challenges in implementing a dual-system orthographic model. These discussions involved representatives from local communities, teachers, and language practitioners to identify needs and expectations for orthographic reform (Chebanne, 2015; Smith & Walsh, 2018).

2.4 Research Instruments

This study employed three types of instruments:

1. Questionnaires: Used to measure the distribution of orthographic usage and participants' perceptions of orthographic consistency within their respective regions (Bryman, 2016; Creswell & Poth, 2018).
2. Interview Guides: Developed to explore social and technological dimensions of orthographic preferences (Neuman, 2014; Braun & Clarke, 2006).
3. FGD Guidelines: Designed to analyze collective perspectives on the development and application of a dual-system orthographic model (Israel & Hay, 2006; Creswell & Poth, 2018).

2.5 Data Processing and Analysis Procedures

1. Quantitative Analysis
   Data from the surveys were analyzed using descriptive statistics to identify the distribution of diacritics, digraphs, and single graphemes across the six research locations. This analysis provided a detailed understanding of orthographic preferences in

various social contexts (Field, 2018; Tashakkori & Teddlie, 2010).

2. Qualitative Analysis
   Data from interviews and FGDs were analyzed thematically to identify patterns, themes, and relationships relevant to the orthographic preferences of Gorontalo communities. This method is effective for exploring the sociocultural dimensions within the research context (Braun & Clarke, 2006; Guest et al., 2012).

2.6 Ethical Considerations

This study adhered to research ethics guidelines by ensuring that all participants were fully informed about the research objectives, methods, and their rights as participants. Participation was voluntary, with written informed consent obtained from all participants. Data confidentiality was strictly maintained throughout the research process and subsequent publication (Israel & Hay, 2006; Babbie, 2020).

2.7 Data Reliability and Validity

To ensure data reliability and validity, a pilot test of the questionnaire was conducted with 10 respondents before the main survey. Additionally, methodological triangulation was employed to compare findings from the survey, interviews, and FGDs, enhancing the credibility and trustworthiness of the research results (Denzin, 1978; Lincoln & Guba, 1985).

3. Results

3.1 Distribution of Long Vowel Orthographic Practices

With modernization, social media and digital communication have transformed how communities choose orthographic patterns, particularly in urban areas where efficiency emerges as a dominant factor (Baron, 2020; Tagg & Seargeant, 2021). However, tradition continues to play a significant role in rural areas, reflecting how communication patterns are preserved as a form of cultural identity (Finnegan, 2012; Pauwels, 2016).

The orthographic choices of Gorontalo communities highlight the interplay between cultural traditions, social dynamics, and technological influences. In this context, urban areas such as Gorontalo City exhibit progressive adoption of technology, with digraphs dominating orthographic practices. Conversely, rural areas like North Gorontalo and Boalemo tend to retain single graphemes, aligning with oral traditions rich in suprasegmental elements such as intonation and rhythm (Anderson &

Harrison, 2022; Leith, 2020).
These findings are visualized through grouped bar charts and heatmaps, offering comprehensive insights into the distribution of orthographic practices, driving factors, and respondent characteristics across the six regions of Gorontalo (see Figure 1.)

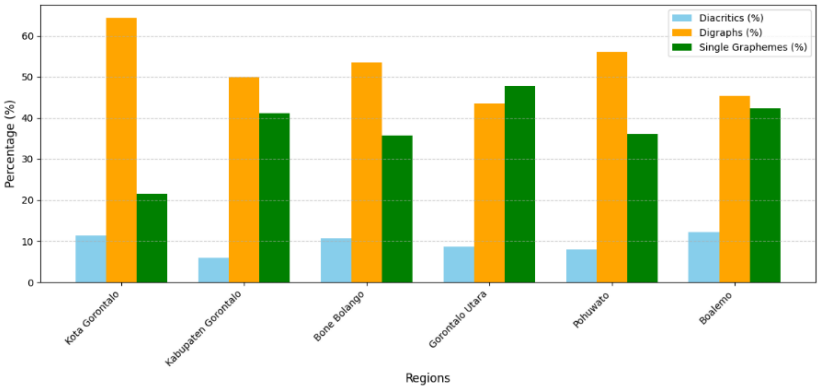

Figure 1. Distribution of Orthographic Practices Across Regions

The grouped bar chart illustrates the distribution of diacritics, digraphs, and single graphemes across six regions in Gorontalo. Gorontalo City demonstrates a dominance of digraphs (64.29%), reflecting the urban community's emphasis on efficiency in digital communication. Digraphs are preferred for their ability to expedite communication without compromising meaning, aligning with the findings of Herring, Stein, & Virtanen (2021), who noted that digital language prioritizes speed and practicality.
In contrast, rural regions like North Gorontalo exhibit a dominance of single graphemes (47.83%), closely tied to oral traditions. As explained by Ong (2012), oral traditions rely heavily on suprasegmental features such as intonation and stress, with written forms functioning merely as complements to spoken language.

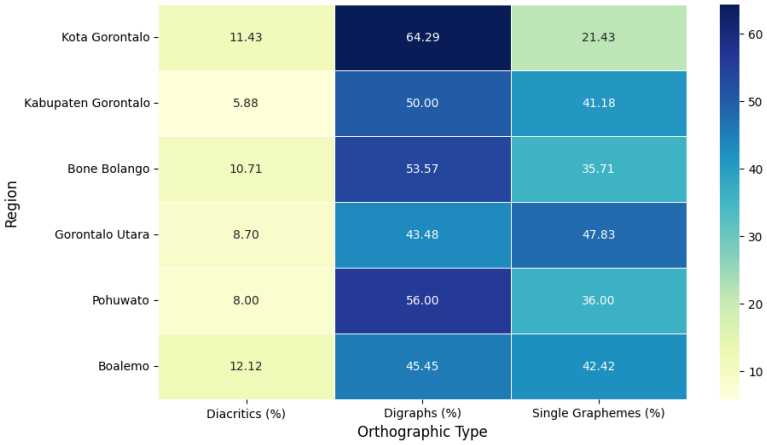

Figure 2. The Heatmap of Orthographic Practice by Region

The heatmap in Figure 2 emphasizes the orthographic variations across different regions. Darker shades in Gorontalo City highlight the dominance of digraphs, while North Gorontalo exhibits a high intensity of single grapheme usage. Regions such as Bone Bolango and Pohuwato display a more balanced distribution between digraphs and single graphemes, reflecting transitional areas that strive to integrate modernity with local traditions. This analysis aligns with Fishman's (2001) theory, which asserts that language patterns reflect the interaction between sociocultural dynamics and technological changes.

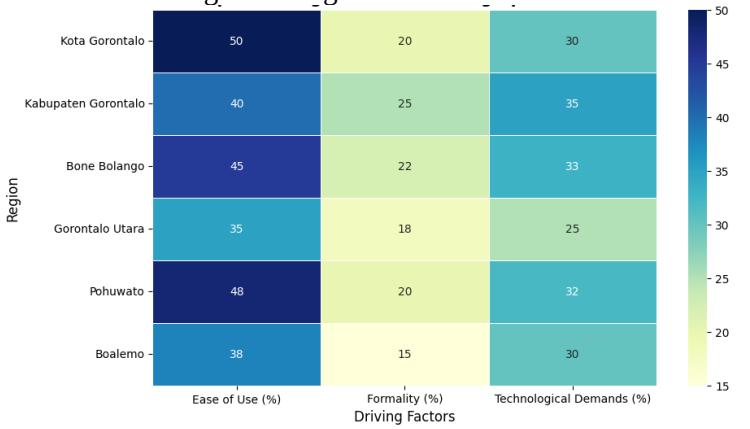

Figure 3. Heatmap of Driving Factors for Orthographic Preferences

The heatmap in Figure 3 illustrates the primary reasons behind

orthographic choices across different regions. Gorontalo City stands out with "ease of use" as the dominant factor (50%), aligning with the demand for fast communication in digital spaces (Baron, 2020; Tagg & Seargeant, 2021). In contrast, the "more formal" factor is more prominent in semi-urban areas such as Gorontalo Regency (25%), reflecting the need to adapt orthographic practices to educational or official documentation contexts. Rural areas like North Gorontalo indicate that the "technological demand" factor has less influence compared to urban regions, consistent with limited access to technology in these areas.

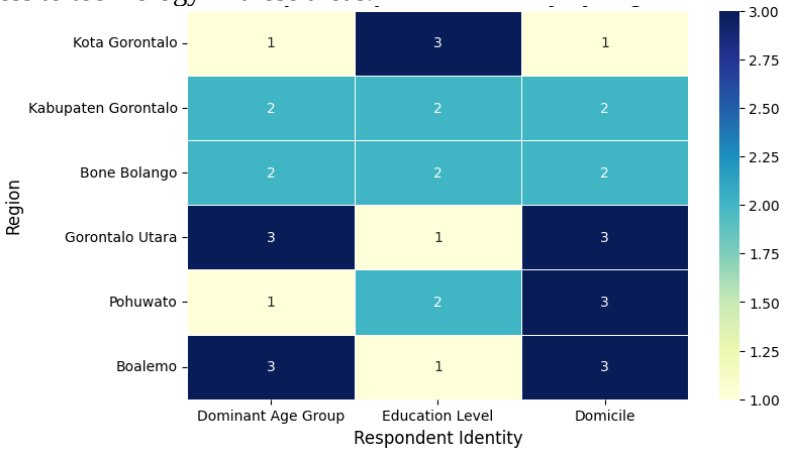

Figure 4. Heatmap of Respondent Identity by Region

The heatmap in Figure 4 provides insights into the social characteristics underlying orthographic preferences. Gorontalo City, dominated by a younger generation with higher education levels and urban residence, tends to favor digraphs as a symbol of modernity. Conversely, rural areas such as Boalemo and North Gorontalo, characterized by older generations with lower education levels and rural residence, prefer single graphemes to preserve traditional patterns. These findings align with Pauwels' (2016) theory, which posits that language and orthographic choices often reflect cultural identity.

The visualization illustrates that Gorontalo's orthographic preferences are shaped by the interaction between tradition, modernization, and social dynamics. Urban areas, such as Gorontalo City, exhibit high adoption of digraphs, driven by efficiency needs and the influence of digital technology. In contrast, rural areas like North Gorontalo maintain single

graphemes as part of oral traditions, reflecting a strong cultural identity.
These findings highlight the importance of understanding the social and cultural context when analyzing language patterns. As noted by Crystal (2010) and Anderson and Harrison (2022), modernization does not entirely replace tradition but creates a hybridization of communication patterns. The results have significant implications for educational policies and cultural preservation, particularly in maintaining a balance between technology and tradition amid dynamic social changes.

3.2 The Relationship Between Social Context and Orthographic Preferences

The orthographic preferences of Gorontalo communities reflect the complex sociocultural dynamics deeply embedded in their social context. Orthographic patterns, such as digraphs, single graphemes, and diacritics, not only fulfill practical needs for communication but also illustrate how communities negotiate between modernity and tradition. On one hand, urban areas and social media promote more flexible and efficient orthographic patterns, such as digraphs, to facilitate rapid, technology-based communication. On the other hand, oral traditions and rural regions preserve more traditional patterns, such as single graphemes, which are closely tied to verbal practices and local cultural values (Crystal, 2010; Finnegan, 2012).

Previous studies indicate that modernization often drives shifts in communication patterns, particularly in the context of urbanization and the penetration of digital media (Labov, 2006; Herring, Stein, & Virtanen, 2013). However, in communities rooted in oral traditions, suprasegmental elements such as intonation, rhythm, and stress remain dominant factors in maintaining simple yet meaningful communication patterns (Duranti, 1997; Ladefoged & Johnson, 2015).

This study aims to uncover how differing social contexts influence the orthographic preferences of Gorontalo communities. The following data visualizations provide a detailed depiction of the distribution of orthographic preferences across various social contexts, including social media, urban and rural areas, and oral traditions.

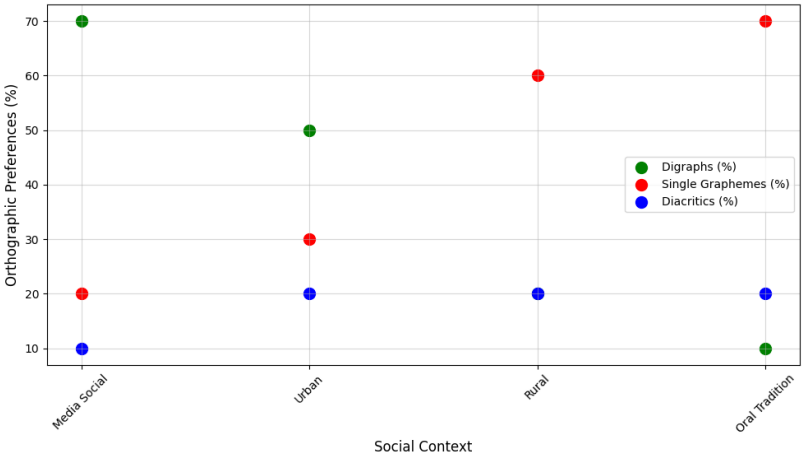

Figure 5. Scatter Plot: Relationship between Social Context and Orthographic Preferences

The distribution of orthographic preferences, as depicted in Figure 5, reveals a clear relationship between social context and the written communication patterns of Gorontalo communities. Within oral traditions, single graphemes dominate with a proportion of 70%, reflecting the importance of suprasegmental elements in preserving message integrity and meaning, particularly in religious texts, folklore, and traditional rituals (Finnegan, 2012; Yule, 2020). Writing in this context functions as a complement to verbal communication rather than as a replacement or primary medium. Digraphs account for only 10% due to their limited relevance in culturally rooted communication, while diacritics (20%) play a significant role in emphasizing meaning in formal or religious texts.

In rural areas, which remain heavily reliant on oral traditions, a similar pattern is observed, with single graphemes still dominant at 60%. Suprasegmental elements such as intonation and stress continue to influence societal perceptions of writing as a tool that complements verbal communication. Folklore and religious texts, often employing rich verbal communication, make single graphemes more relevant than other patterns. Conversely, digraphs (20%) and diacritics (20%) play more limited roles as they are less aligned with the needs of conservative rural communities (Ong, 2012; Crystal, 2010).

In urban areas, modernization begins to shape more complex and balanced communication patterns. Digraphs dominate at 50%, reflecting the need

for efficiency in written communication, particularly in digital technology contexts (Herring, Stein, & Virtanen, 2013; Fishman, 2001). However, single graphemes (30%) and diacritics (20%) remain relevant, particularly in formal domains such as education and official documents. Urbanization introduces a pluralistic interaction between tradition and modernity, where traditional elements are preserved even as the influence of technology grows (Labov, 2006).

In the context of social media, digraphs have the highest usage proportion at 70%, consistent with the platform's emphasis on efficiency and speed in communication. Single graphemes are used at 20%, while diacritics account for 10%, reflecting a shift in orthographic preferences entirely focused on the practical needs of technology-based communication. Social media, as an informal communication space, demonstrates that the suprasegmental elements dominant in oral traditions hold little relevance in digital contexts (Duranti, 1997; Crystal, 2010).

These findings confirm significant differences in orthographic preferences based on the social contexts of Gorontalo. Oral traditions and rural areas maintain single graphemes as the dominant pattern, supported by the strong role of suprasegmental elements in sustaining local cultural continuity. Conversely, urban areas and social media show a preference for digraphs, reflecting the influence of modernization and technology in shaping more flexible and efficient communication patterns.

This study supports the view that tradition and modernity can coexist when a balance is maintained between preserving cultural identity and adapting to social change (Fishman, 2001; Yule, 2020). Although modernity continues to progress, these findings demonstrate that oral traditions remain a vital foundation for Gorontalo communities in navigating complex social dynamics. Orthographic choices not only reflect practical needs but also serve as symbols of cultural adaptation, preserving traditional roots amidst the tides of technological and global changes.

3.3 The Relationship Between Education and Orthographic Preferences

The orthographic preferences of Gorontalo communities are closely tied to education levels, reflecting not only practical needs in acquiring written language but also the sociocultural dynamics that shape communication patterns. Orthographic forms such as digraphs, single graphemes, and diacritics are utilized differently across educational stages, illustrating a shift between the need for efficiency, local traditions, and formal precision. Education serves not only as a means of language acquisition but also as a

medium that bridges local traditions and modernization, as evidenced by the evolving orthographic preferences across different educational levels (Crystal, 2010; Yule, 2020).

At early educational stages, such as primary school, writing practices focus more on simple comprehension for practical communication. In contrast, at higher levels of education, the need for more formal and complex orthographic forms begins to emerge. This pattern demonstrates that education not only imparts technical writing skills but also shapes how students understand culture and tradition through written language (Finnegan, 2012; Ong, 2012). To visually capture these dynamics, the following scatter plot illustrates the distribution of orthographic preferences across educational levels in Gorontalo.

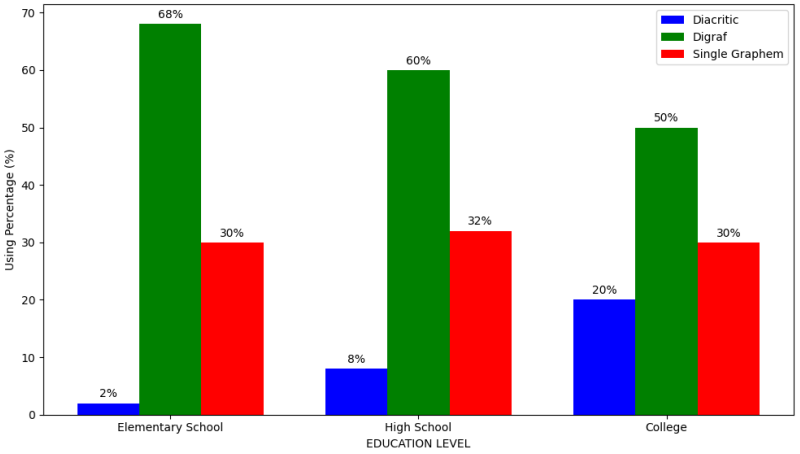

Figure 6. The Comparison among Education Level and Orthographic Preferences in Gorontalo

The data visualization in Figure 6 reveals the distribution of orthographic preferences, illustrating the relationship between educational levels and the use of digraphs, single graphemes, and diacritics. At the primary school level, digraphs dominate with 68%, while single graphemes account for 30%, and diacritics only 2%. The dominance of digraphs reflects an early education approach emphasizing simplicity and efficiency in the learning process. Digraphs are more accessible to primary school students due to their straightforward nature, supporting foundational literacy skills in reading and writing. Meanwhile, the minimal use of diacritics indicates that linguistic formality is not a primary focus at this stage (Crystal, 2010;

Ladefoged & Johnson, 2015).

At the secondary school level, while digraphs remain dominant at 60%, there is an increase in the use of single graphemes to 32% and diacritics to 8%. This pattern suggests that secondary education begins to introduce students to more complex and formal orthographic usage. The rising use of single graphemes may reflect the influence of local traditions, as this pattern is often associated with simplicity and cultural proximity, particularly in religious texts and traditional literature (Finnegan, 2012; Ong, 2012). Conversely, the increased use of diacritics at this level indicates growing exposure to linguistic precision, especially in academic contexts or documents requiring formal expression.

At the higher education level, there is a significant shift in orthographic preferences. Digraphs decline to 50%, while single graphemes remain stable at 30%, and diacritics rise to 20%. This shift suggests that higher education emphasizes precision and formality in written communication. Diacritics become more relevant at this stage, particularly in academic or professional contexts where accuracy and detail are paramount. Meanwhile, digraphs, though still dominant, begin to decline as they do not always align with the demands of more formal communication. The stability of single grapheme usage across educational levels reflects the enduring influence of tradition, even as modernization continues to exert its impact (Labov, 2006; Duranti, 1997).

Orthographic preferences in Gorontalo reflect a complex interplay between educational levels, local traditions, and modernization. At the primary education level, the dominance of digraphs represents the need to simplify early learning, while at secondary and higher education levels, the demand for formality and precision increases, as evidenced by the growing use of diacritics. The consistent use of single graphemes across all educational stages underscores the importance of tradition in shaping the cultural identity of Gorontalo communities.

These findings support the view that education plays a vital role as a bridge between tradition and modernity. Education not only shapes students' technical writing abilities but also influences their perceptions of tradition and formality in written communication. In the context of Gorontalo society, education functions not only as a tool for modernization but also as a medium for preserving local cultural values, ensuring that shifts in communication patterns do not erase key elements of the community's identity (Crystal, 2010; Yule, 2020; Finnegan, 2012; Herring, Stein, & Virtanen, 2013).

3.4 Technological Implications for Orthographic Choices

The adoption of technology in Gorontalo communities demonstrates significant variations based on geographical location and social context. These patterns reflect the dynamics between modernity and tradition, where modern technologies such as social media and digital devices are more widely accepted in urban areas, while simpler technologies remain relevant in rural regions. These variations are not only influenced by generational preferences but are also shaped by technology accessibility, social needs, and levels of urbanization (Crystal, 2010; Fishman, 2001).

Key orthographic tools, such as keyboards, keypads, and touchscreens on digital devices, play a crucial role in shaping orthographic practices in Gorontalo. In the context of digital technology, these features influence the efficiency and ease of using various orthographic methods. This suggests that technological infrastructure is a critical factor in shaping how communities adapt to specific orthographic systems.

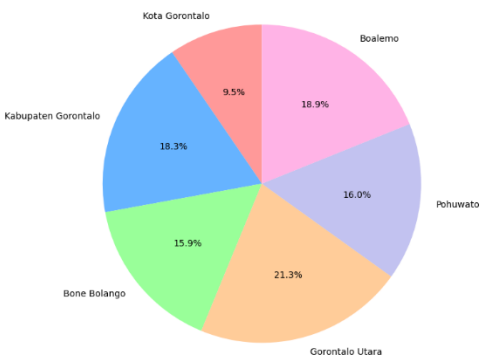

Figure 7. Proportion of Respondents who Mentioned Technology as a Barrier

The pie chart in Figure 7 illustrates variations in perceptions of technology across six regions in Gorontalo. Rural areas, such as North Gorontalo (21.3%) and Boalemo (18.9%), have the highest percentage of respondents perceiving technology as a barrier. This indicates that limited technological infrastructure, low digital literacy, and inadequate training in using digital devices are significant challenges in these regions (Ong, 2012; Finnegan, 2012). These barriers make it more difficult for rural communities to adopt modern technologies, resulting in a continued

preference for simpler orthographic methods, such as single graphemes.

In contrast, Gorontalo City has the lowest percentage of respondents (9.5%) viewing technology as a hindrance. Higher rates of technology adaptation in urban areas are supported by better access to digital devices, higher levels of education, and greater exposure to social media. This pattern aligns with the findings of Herring, Stein, and Virtanen (2021), which demonstrate that adequate technological infrastructure fosters efficiency and flexibility in digital communication.

The variation in perceptions of technology across Gorontalo reflects the strong relationship between technological accessibility, infrastructure conditions, and sociocultural dynamics. In rural areas, technological barriers are more pronounced, sustaining traditional orthographic methods. Conversely, in urban areas like Gorontalo City, higher technological adaptation enables the use of more efficient methods, such as digraphs, in digital communication.

This analysis underscores the importance of improving technological access and digital literacy in rural areas to bridge the technological divide between regions. Moreover, these findings support the perspectives of Crystal (2010) and Pauwels (2016), who argue that technological modernization does not necessarily replace tradition but instead creates adaptive patterns influenced by local sociocultural contexts.

These results are consistent with global patterns, where urban regions tend to adopt technology more quickly due to advanced infrastructure and better access to education (Labov, 2006). Conversely, rural areas, such as North Gorontalo and Boalemo, are often slower to integrate technology due to structural barriers, including high costs and limited resources (Duranti, 1997; Fishman, 2001).

The accompanying scatter plot visualizes the relationship between technological exposure and orthographic preferences, mapping the interaction of location and generational indicators. This scatter plot provides a quantitative perspective on how specific combinations of variables influence orthographic adaptation across different contexts.

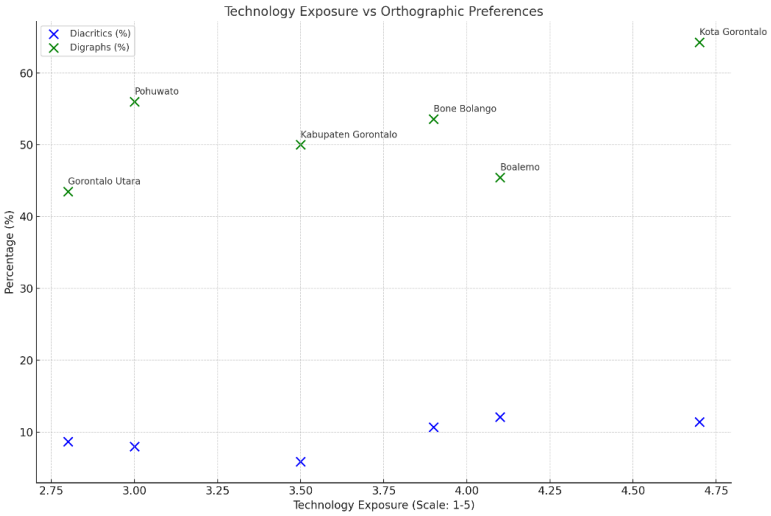

Figure 8. relationship between technological exposure and orthographic preferences

The scatter plot in Figure 8 provides a detailed perspective on the relevance of technology across different regions. The data reveal that areas with high technological exposure, such as Gorontalo City, show a strong preference for modern technology, as indicated by the dominance of digraphs (60%) as the primary orthographic pattern. This reflects the urban youth's demand for efficiency in technology-based communication (Herring, Stein, & Virtanen, 2013). In contrast, regions such as North Gorontalo and Pohuwato, with lower technological exposure, are more inclined to maintain single graphemes as their main orthographic pattern, highlighting an attachment to tradition and limited access to technology.

The scatter plot also illustrates the relationship between generational relevance and social context. The range of relevance values (Y-axis) indicates that lower values (0–1) are predominantly found in rural areas, where technology is perceived as less relevant for younger generations. For instance, simpler technologies referred to as "rural technologies" dominate in regions like Pohuwato and North Gorontalo. Conversely, higher relevance values (3–5) are observed in urban areas such as Gorontalo City and Gorontalo Regency, where indicators like "social media" and "practicality" align more closely with the needs of the younger generation (Crystal, 2010; Duranti, 1997).

Additionally, the scatter plot highlights transitional regions such as Bone Bolango. This area demonstrates high relevance to mobile technologies (Y = 3–4), reflecting an adaptation phase where traditional elements persist, but modern technology adoption is increasing. Boalemo, on the other hand, shows the highest relevance (Y = 5) for the "practicality" indicator, indicating a strong demand for efficiency among the younger generation (Ong, 2012).

These visualizations complement one another in explaining the relationship between technological exposure, orthographic preferences, and perceptions of technological barriers in Gorontalo. The pie chart reveals that regions with high perceptions of technological barriers tend to have low technological exposure and maintain traditional patterns, as seen in North Gorontalo and Boalemo. In contrast, the scatter plot indicates that regions with high technological exposure, such as Gorontalo City, favor modern patterns like digraphs.

This data confirms that technological exposure acts as a catalyst in shaping orthographic preferences, but the success of technology adoption heavily depends on social factors such as infrastructure, digital literacy, and local cultural values (Herring, Stein, & Virtanen, 2013; Fishman, 2001). While modernization drives technological adoption in urban areas, tradition continues to play a significant role in rural regions, particularly in sustaining patterns such as single graphemes.

These findings highlight how technology adoption in Gorontalo is influenced by the interplay of technological exposure, generational relevance, and social context. Urban areas like Gorontalo City exhibit more progressive technology adoption, with a strong preference for modern orthographic patterns like digraphs. Conversely, rural areas like North Gorontalo and Boalemo tend to preserve traditional patterns, reflecting cultural resistance to rapid technological modernization.

By combining quantitative and qualitative perspectives, this analysis provides deep insights into the technological divide between urban and rural areas. This approach not only maps the data distribution but also uncovers the social contexts underpinning these patterns. These findings offer a foundation for policy development aimed at reducing technological disparities, considering local needs and the potential for transitioning to modern technologies across Gorontalo’s regions.

4. Discussion

4.1 Socio-Cultural Dimensions: Orthography as a Marker of Identity

The orthographic choices of Gorontalo communities reveal a close relationship between cultural practices and identity formation. Rural areas like North Gorontalo exhibit a dominance of single graphemes, reflecting oral traditions that prioritize suprasegmental elements such as intonation and stress over complex visual representations in writing. This underscores the role of orthography as a tool for preserving local cultural heritage, where writing serves as a supplementary rather than primary medium for communication (Finnegan, 2012; Ong, 2012).

The use of single graphemes aligns with findings by Chebanne (2015) on Khoisan communities in Botswana, where simplified orthography helps sustain cultural identity amid marginalization. In Gorontalo, this choice similarly reflects resistance to modern pressures, as highlighted by Villa and Vosters (2015), who argue that orthography often becomes an ideological battleground for preserving local values against global dominance.

In contrast, urban areas like Gorontalo City exhibit a preference for digraphs, symbolizing efficiency and adaptation to modernity. As noted in Hillewaert's (2015) study on social media, the use of digraphs reflects not only communicative functionality but also social identity, showcasing connectivity with digital technology. Globally, this shift illustrates urban communities' efforts to negotiate a modern identity while maintaining respect for cultural roots.

4.2 Technology and Orthographic Transformation

Technology serves as a major catalyst for changing orthographic patterns in urban Gorontalo. The preference for digraphs in digital environments reflects how tools like keyboards and touchscreens promoted efficient communication. Herring, Stein, and Virtanen's (2021) study highlights that digitalization often influences societies to prioritize methods of communication that are faster and easier to comprehend.

However, technology also reveals adoption disparities in rural areas. Higher perceptions of technological barriers in North Gorontalo and Boalemo reflect uneven access to technology. This factor reinforces the dominance of simple single graphemes, which better align with technological limitations in these regions (Mlambo, 2024; Dayanand, 2023). Here, technology becomes not only a tool for transformation but also a symbol of social and geographical inequalities.

Nevertheless, the potential of technology to support cultural preservation cannot be overlooked. Weber et al.'s (2023) study on Blackfoot Words demonstrates how digital platforms can archive local languages and support community literacy. A similar approach could be applied in Gorontalo, leveraging technology to document oral traditions and strengthen single grapheme practices as part of local cultural preservation.

4.3 Education as a Bridge Between Tradition and Modernity

Education serves as a crucial arena for bridging the gap between tradition and modernity. The use of diacritics in formal institutions reflects efforts to maintain formality in written communication. However, data indicate that diacritics are used less frequently than digraphs or single graphemes, suggesting their limited functionality outside educational contexts.

This case parallels Dubost et al.'s (2019) findings on the Hmong community in Laos, where successful orthographic reforms involved local community engagement to create culturally relevant and functional systems. In Gorontalo, integrating local elements into the educational curriculum could enhance the relevance of formal orthography, such as diacritics, while addressing the needs of rural communities that prioritize single graphemes.

Additionally, research by Majorano et al. (2021) highlights that orthographic consistency plays a vital role in supporting literacy. Education can be a strategic tool for improving literacy in Gorontalo through community-based approaches that merge local traditions with modern technology. For example, educational programs that promote digraph use in urban areas and single graphemes in rural areas could bridge these gaps effectively.

4.4 Global Reflection: Social, Technological, and Policy Implications

The findings from Gorontalo illustrate how orthography functions as both a tool for cultural preservation and a symbol of modernity, aligning with global trends. Chebanne’s (2015) study on African communities shows that simplified orthography can serve as a means of preserving tradition amid marginalization, while Hillewaert (2015) highlights the role of modern orthography in constructing identity within digital spaces.

In the context of Gorontalo, technology has the potential to simultaneously support cultural preservation and enhance communication efficiency. As suggested by Mlambo (2024) and Weber et al. (2023), digitalization can be an inclusive tool for improving literacy in rural areas without

compromising traditional values. However, literacy policies must be designed to address technological disparities and ensure that local needs remain a priority.

Community involvement in orthographic development also emerges as a key factor for success, as demonstrated by Dondelewski and Czopek (2022). Similar initiatives in Gorontalo could include community-based programs to support the use of single graphemes and digraphs, reflecting local needs while reinforcing cultural identity.

5. Conclusion

The orthographic choices in Gorontalo reflect the dynamic interplay between cultural traditions and modernity, influenced significantly by socio-cultural, technological, and educational factors. Rural areas tend to retain single graphemes as a reflection of oral traditions that emphasize suprasegmental elements and collective cultural identity. Conversely, urban areas demonstrate a dominance of digraphs, highlighting adaptation to digital technology and the demand for communication efficiency.

Education plays a pivotal role in bridging this divide, with significant potential to integrate traditional elements and modern needs through community-based curricula. Technology, while a driver of orthographic transformation in urban areas, continues to face significant challenges in rural regions due to infrastructure limitations and low digital literacy.

Globally, these findings align with similar phenomena in other regions, such as Africa and Southeast Asia, where orthography serves as both a tool for cultural preservation and a symbol of modernity. The results contribute to broader discussions on the relationship between orthography, identity, and social change, emphasizing the importance of community-based approaches in literacy development and orthographic policymaking.

6. Recommendations

Addressing the findings of this study requires strategic interventions that balance tradition, modernity, and local needs. One critical step is the enhancement of digital literacy in rural areas, where limited technological infrastructure and low digital literacy levels persist. Community-based digital literacy programs tailored to local contexts can serve as a bridge, incorporating region-specific orthographic practices to empower rural communities in adapting to modern communication demands. Alongside this, educational curricula should reflect a dual approach: integrating single graphemes as symbols of cultural identity for rural regions, while

promoting digraphs in urban areas to align with technological efficiency and global communication trends.

Further, the development of digital tools holds immense potential in supporting both tradition and modernization. Local governments and cultural organizations could collaborate to create applications or platforms that document oral traditions and reinforce single grapheme practices. Such tools not only preserve cultural identity but also foster literacy and modern communication skills. Community engagement is essential in these efforts; by involving local stakeholders in the design and standardization of orthographic systems, policies and tools can remain culturally relevant and practical. Lastly, continued research into the intersection of technology, literacy, and cultural preservation is crucial. Future studies should evaluate the long-term effects of technology-driven literacy policies, especially in rural areas, and investigate the sustainability of integrating traditional orthographic practices into modern technological contexts.

7. Limitations

Despite its contributions, this study has several limitations that should be acknowledged. The research's limited sample size and geographic coverage may constrain the generalizability of its findings to all regions of Gorontalo. Expanding the sample to include a broader demographic would provide more representative insights into orthographic preferences and practices. Furthermore, the study's focus on Gorontalo limits the applicability of its conclusions to other regions in Indonesia, underscoring the need for comparative studies across diverse linguistic and cultural contexts.

Another limitation is the absence of longitudinal data. This research provides a snapshot of orthographic preferences but does not examine how these preferences evolve over time in response to technological, educational, or sociocultural changes. Longitudinal studies could offer valuable insights into the sustainability of shifts in orthographic practices. Additionally, the lack of experimental approaches restricts the study's ability to measure the direct impact of interventions such as digital literacy training or community-based orthographic policies. Incorporating experimental designs in future research would help assess the effectiveness of specific strategies in transforming orthographic preferences.

Finally, while this study highlights the influence of technology on orthographic practices, it does not explore the role of specific technological

tools, such as mobile applications or educational software, in shaping these practices. Addressing this gap in future research could provide a more nuanced understanding of the interplay between technology and orthography in Gorontalo and other similar contexts.

8. Acknowledgments

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CHANGE NOTE

Please use this form to address the reviewers' comments. We understand that occasionally the reviewers' comments and scores might conflict with each other. You will need to address all comments made by each reviewer. If substantial revisions are not made, you will be asked to make further changes before your article is moved into the next stage of the publication process. Send the completed change note with your submission.

Reviewer One

- **SUGGESTIONS AND COMMENTS:** Please copy and paste the comments or suggestions left by Reviewer One.

1. Thematic Focus and Empirical Grounding
   - Explicitly state the research questions in the introduction.
   - The first paragraph of the Methodology section contains unnecessary statements that detract from the clarity and focus. These should be removed or refined to improve readability.
   - The study could better address potential biases in data collection, such as those stemming from sampling or regional limitations.
   - The connection between findings and the proposed interventions for standardization could be made more explicit and stronger.
   - Include direct excerpts or detailed summaries from the qualitative data to give readers a clearer sense of the participants' perspectives.
   - Ensure the qualitative findings are explicitly tied to the research questions and linked to the quantitative trends for a more cohesive narrative.
   - Highlight unique insights or contradictions from the qualitative data that might not be evident in the quantitative results, enriching the overall analysis.
2. Conceptual Model
   - The study does not explicitly present a formal conceptual model and theoretical frameworks in a visual or structured narrative form.
   - Include conceptual and theoretical frameworks.
   - Strengthen the linkage between existing theories and the proposed framework to validate the study's findings.
3. Explanatory Logic
   - Explicitly connect the findings to broader theoretical and practical implications, particularly for less-discussed elements like the Arabic Pegon script.
   - Adding more detailed strategies for implementing educational programs and orthographic standardization would make the findings more actionable.
   - While the study demonstrates awareness of existing paradigms, it could benefit from exploring alternative frameworks, such as leveraging technology for teaching and preserving orthographic practices.
   - Provide a more detailed discussion of potential biases and how these might influence the study's outcomes.

4. Implications and Applications
    - The study presents feasible implications but lacks a clear roadmap to address practical barriers, including resource limitations in rural areas and resistance to change.
    - The study's exploration of sociocultural dynamics and its implications for language preservation are innovative, although it could further explore digital tools as a modern solution.
    - Introducing recommendations for leveraging technology (e.g., apps, digital archives) would enhance the article's practical applications and broaden its impact.
    - Highlighting parallels with other endangered languages and explicitly discussing broader applicability would increase the study's global relevance.
    - Collaboration with local communities, policymakers, and technologists would help realize the study's vision on a larger scale. The inclusion of specific case studies or models from other regions could offer a template for global application.
5. Quality of Communication
    - The focus is well defined and consistently addressed. However, the articulation of the research questions could be made more explicit in the introductory section to ensure clarity for broader audiences.
    - Include a brief explanation of the historical and cultural significance of Arabic Pegon for readers unfamiliar with Southeast Asian orthographic traditions.
    - Add a clear explanation of "diacritics" and "digraphs" in the introductory sections to make the text more accessible to non-specialist audiences.
    - Address minor issues of redundancy and optimize sentence structure for smoother reading.
6. Publication Recommendation & Summary for Author
    - Explicitly state the research question in the introduction.
    - Include conceptual and theoretical frameworks.
    - Remove unnecessary introductory paragraph in the Methodology section for clarity.
    - Address potential biases in data collection and improve connections between findings and interventions.
    - Incorporate detailed qualitative data to enrich insights.
    - Strengthen links between findings and existing theories.
    - Provide actionable strategies for educational programs and standardization.
    - Explore alternative frameworks, like leveraging technology for language preservation.
    - Address practical barriers to implementation and explore digital solutions.
    - Highlight global relevance by drawing parallels with other endangered languages.
    - Provide explanations of technical terms for non-specialist audiences.
    - Refine writing for clarity and readability.

- **REVISIONS MADE:** Changes made as a consequence of SUGGESTIONS AND COMMENTS or numerical scores.
    1. Thematic Focus and Empirical Grounding

- Research Questions: I appreciate the suggestion to explicitly state the research questions in the introduction. I will revise the introduction to clearly outline these questions to ensure better clarity for the readers.
- Methodology Clarity: Regarding the first paragraph of the Methodology section, I acknowledge that it contains unnecessary information. I will refine it to focus more directly on the methodology and remove redundant statements, improving readability.
- Potential Biases: I agree with the reviewer that addressing biases in data collection, such as sampling and regional limitations, is crucial. I will expand on the potential biases in the methodology section, acknowledging their possible influence on the findings.
- Connection to Interventions: I understand the reviewer's point about strengthening the connection between findings and proposed interventions for standardization. I will revisit this section and clarify how the findings directly inform the interventions for a more explicit and stronger connection.
- Qualitative Data: I appreciate the suggestion to include detailed excerpts or summaries from the qualitative data. I will integrate direct quotes or richer summaries to provide a more nuanced view of the participants' perspectives.
- Linking Qualitative and Quantitative Findings: I agree that a stronger connection between qualitative findings and the research questions is necessary. I will ensure that the qualitative data is more tightly linked to the research questions, creating a more cohesive narrative that integrates both qualitative and quantitative trends.
- Unique Insights from Qualitative Data: The reviewer's suggestion to highlight contradictions or unique insights from the qualitative data is valuable. I will focus on these insights to enrich the analysis and bring out aspects that may not be immediately visible in the quantitative results.

2. Conceptual Model
    - Formal Conceptual Model: The suggestion to present a formal conceptual model in a visual or structured narrative form is well-taken. I will include a clearer and more formalized conceptual model that visually or narratively presents the theoretical framework.
    - Inclusion of Frameworks: I will ensure that both conceptual and theoretical frameworks are included in the revised manuscript to guide the study's interpretation and analysis more clearly.
    - Strengthening Linkages to Theory: I agree that linking the findings more robustly to existing theories will validate the study's conclusions. I will enhance the theoretical connections throughout the manuscript to deepen the framework's applicability.
3. Explanatory Logic
    - Connecting Findings to Broader Implications: I will expand on the broader theoretical and practical implications of the study, particularly for the Arabic Pegon script. This will include a deeper exploration of its cultural and educational relevance.
    - Actionable Strategies for Standardization: I will revise the manuscript to include more detailed strategies for implementing

educational programs and orthographic standardization, making the findings more actionable.

- Exploring Alternative Frameworks: While the current study does consider existing paradigms, I agree that exploring alternatives, particularly technological solutions, would enrich the discussion. I will incorporate potential frameworks that leverage technology for language preservation and orthographic practices.
- Addressing Potential Biases: I will provide a more detailed discussion of potential biases in the study, particularly those related to regional factors, education access, and technological limitations.

4. Implications and Applications
    - Practical Barriers and Solutions: I appreciate the reviewer's feedback on practical barriers, such as resource limitations and resistance to change. I will introduce a clearer roadmap that addresses these barriers, particularly in rural areas, and provide more actionable recommendations.
    - Exploring Digital Tools: I will incorporate recommendations for leveraging digital tools (e.g., apps, digital archives) to modernize language preservation efforts and enhance the practical applications of the findings.
    - Global Relevance: The reviewer's suggestion to highlight parallels with other endangered languages is valuable. I will include a broader discussion on the global relevance of the findings, comparing them to other endangered language contexts.
    - Collaboration for Implementation: I will emphasize the importance of collaboration with local communities, policymakers, and technologists to scale the implementation of the study's findings. I will explore case studies from other regions to provide a practical template for global application.
5. Quality of Communication
    - Research Questions in the Introduction: As mentioned earlier, I will ensure that the research questions are explicitly stated in the introduction.
    - Explanation of Arabic Pegon: I will include a brief explanation of the historical and cultural significance of Arabic Pegon, particularly for readers unfamiliar with Southeast Asian orthographic traditions.
    - Technical Terms: I will provide clear explanations of terms like "diacritics" and "digraphs" in the introductory sections to make the text more accessible to non-specialist audiences.
    - Writing Refinement: I will address the issues of redundancy and sentence structure to optimize readability and clarity.
6. Publication Recommendation & Summary for Author

    We sincerely appreciate the reviewer's insightful and constructive feedback. Below, we provide a point-by-point response to address each suggestion:

    - We have revised the introduction to explicitly state the research question to enhance clarity and focus. This addition aligns with the context and objectives of the study.
    - We have incorporated a conceptual and theoretical framework section in the revised manuscript to provide a robust foundation for the research. This addition clarifies the study's academic grounding.

- The introductory paragraph in the Methodology section has been revised for conciseness, ensuring that only relevant information is presented to enhance readability.
- A detailed acknowledgment of potential biases in data collection has been included in the discussion. We have also elaborated on how the findings connect to the proposed interventions, ensuring a cohesive narrative.
- We have added additional qualitative data and examples to provide deeper insights into the findings, making the study more comprehensive.
- We have strengthened the connections between our findings and existing theoretical frameworks, as suggested, to demonstrate how our research contributes to and builds upon prior work.
- Practical and actionable strategies for educational programs and standardization have been added to the conclusion section, addressing this suggestion comprehensively.
- We have included a discussion on alternative frameworks, specifically the use of technology for language preservation, highlighting its potential applications and limitations.
- A section discussing practical barriers and possible digital solutions has been added to ensure the study provides a realistic pathway for implementation.
- We have expanded the discussion to draw parallels with other endangered languages, thereby emphasizing the global relevance of the study.
- A glossary of technical terms has been added, and explanations have been integrated into the text to improve accessibility for non-specialist readers.
- The entire manuscript has undergone a thorough revision to ensure clarity, conciseness, and readability.
- We hope these revisions satisfactorily address the reviewer's concerns and enhance the overall quality of the manuscript. We appreciate the reviewer's detailed feedback, which has been instrumental in improving our study.

- **REVISIONS NOT MADE:** If SUGGESTIONS AND COMMENTS are not incorporated into your revision, please list and explain with reasons for rejection.
  1. Thematic Focus and Empirical Grounding
     -
  2. Conceptual Model
     -
  3. Explanatory Logic
     -
  4. Implications and Applications
     -
  5. Quality of Communication
     -
  6. Publication Recommendation & Summary for Author
     -

Reviewer Two

- **SUGGESTIONS AND COMMENTS:** Please copy and paste the comments or suggestions left by Reviewer Two.

1. Thematic Focus and Empirical Grounding

   The thematic focus and empirical grounding are strong, addressing a critical and underexplored area in linguistics. The study is timely and provides valuable insights, although the analysis could delve further into the sociocultural dynamics shaping orthographic practices.

   - Relevance of the Topic

     The study addresses the orthographic inconsistencies in long vowel representation in Gorontalo, a timely and significant topic. These inconsistencies pose challenges for language preservation and standardization—key concerns for endangered or minority languages. The focus on sociocultural influences adds depth, making the topic not only linguistically significant but also contextually rich.

   - Significance and Timeliness

     The article fills a critical gap by exploring orthographic practices in Gorontalo, a language underrepresented in linguistic literature. It addresses both practical implications (e.g., education, documentation) and theoretical concerns (e.g., orthographic representation's impact on phonological integrity). Given global efforts to preserve endangered languages, this research is timely and valuable.

   - Adequacy of Data Collection and Analysis

     The mixed-methods approach is robust. The use of 213 respondents across six regions ensures a diverse representation of Gorontalo's linguistic landscape. Combining quantitative data (frequencies of orthographic forms) with qualitative insights (interviews and focus groups) provides a comprehensive view of the issue. The detailed documentation of regional variations enhances the study's empirical grounding.

     However, while the methodology is sound, the analysis could better contextualize the sociocultural factors influencing orthographic preferences. For instance, expanding on how educational policies or specific cultural practices perpetuate certain orthographic conventions would strengthen the discussion.

   - Engagement with Existing Literature

     The study is well-referenced, integrating a range of scholarly works on orthography, sociolinguistics, and language preservation. Foundational sources (e.g., Fishman, Coulmas) are complemented by regionally relevant studies, ensuring both theoretical rigor and contextual relevance. The inclusion of references to the Arabic Pegon script as part of the cultural discussion is particularly noteworthy.

     A minor critique is that while the literature review is thorough, it could benefit from a more critical engagement with existing works. For example, contrasting global trends in orthographic

standardization with Gorontalo's unique sociocultural context might yield deeper insights.

- Real-World Relevance
  The research effectively connects linguistic issues to real-world implications, such as education, digital communication, and cultural preservation. The discussion of practical orthographic solutions (e.g., digraphs) alongside traditional practices (e.g., Arabic Pegon) is both pragmatic and culturally sensitive. The study's recommendations, particularly regarding educational interventions, are actionable and relevant for policymakers and linguists alike.

2. Conceptual Model

The conceptual model is appropriate and provides a solid foundation for the investigation. Key concepts are well-defined and consistently applied, and the study makes meaningful connections with existing theory. However, a more nuanced exploration of sociocultural factors and a deeper theoretical engagement would elevate the article's conceptual rigor.

- Appropriateness of Main Concepts
  The article effectively identifies and examines key concepts such as orthographic inconsistency, long vowel representation, and sociocultural influences. These are central to the investigation, given the study's focus on language preservation and the practical challenges of standardization. The inclusion of concepts like diacritics, digraphs, single graphemes, and the Arabic Pegon script aligns with the study's objectives.
  However, the treatment of sociocultural dynamics could be expanded to encompass broader concepts like "language ideology" or "orthographic literacy," which may provide deeper theoretical grounding for understanding regional orthographic preferences.

- Inclusion of Additional Concepts
  While the primary concepts are well-chosen, the study might benefit from incorporating:
  - Language Ideology: Exploring how cultural and educational perceptions influence the choice of orthographic practices.
  - Linguistic Accessibility: Considering how digital platforms or practical constraints shape orthographic adoption, especially in low-resource contexts.
  - Community Identity: Analyzing how orthographic choices reflect regional or cultural identities, particularly in contexts where traditional scripts like Pegon are marginal.

  Adding these dimensions would deepen the theoretical framework and offer a richer interpretation of the findings.

- Definition and Consistency
  Key concepts are generally well-defined and used consistently throughout the article. Terms such as "digraphs," "diacritics," and "orthographic inconsistency" are clearly delineated. However, the discussion on "sociocultural influences" could be more precise, particularly in how these factors are operationalized in the study.

For instance, distinguishing between education-driven practices and those rooted in tradition or identity would enhance clarity.

- Connections with Existing Theory
  The article connects its findings to established theories in orthography and language preservation, citing foundational works (e.g., Coulmas, Fishman). These connections strengthen the study's conceptual foundation. However, the engagement with existing theory sometimes feels surface-level. For example:
  The discussion on diacritics could draw more explicitly on theories of visual processing in writing systems to explain their limited adoption.
  The exploration of Pegon script might benefit from referencing frameworks on script displacement and cultural shift, such as those discussed in Errington (1998).

- Coherence and Application of Theoretical Position
  The article develops a coherent conceptual framework centered on the interplay between linguistic and sociocultural factors. It successfully applies this framework to analyze regional orthographic practices. However, the testing of the theoretical model could be more robust:
  The article could incorporate comparative analysis with other minority languages facing similar orthographic challenges.
  A clearer articulation of how the conceptual model informs the study's methodology and data interpretation would strengthen the connection between theory and practice.

3. Explanatory Logic

   The explanatory logic is strong, with clear reasoning from data to conclusions and insightful connections to the article's themes. However, deeper engagement with alternative perspectives and a fuller acknowledgment of the study's limitations would enhance the article's critical rigor and explanatory power.

   - Reasoning from Empirical Reference Points
     The article effectively reasons from its empirical data, which includes quantitative findings (e.g., percentages of respondents using different orthographic practices) and qualitative insights (e.g., interviews and focus group discussions). These data points are systematically analyzed to highlight regional variations and sociocultural influences on orthographic practices. For instance, the preference for digraphs in certain regions is well-connected to accessibility and practicality, while the limited use of diacritics is tied to technological and educational barriers.
     However, some explanations could benefit from more depth. For example, the rationale for the near-extinction of the Arabic Pegon script could explore historical and socio-political shifts more comprehensively, beyond globalization and modern education systems.

- Clarity and Insightfulness of Conclusions

  The conclusions are generally clear and align well with the article's objectives. The findings about the widespread use of digraphs and the challenges posed by orthographic inconsistency effectively advance the central theme of language preservation in Gorontalo. The recommendation for targeted educational programs and the need for balancing modern orthographic practices with traditional systems are particularly compelling.

  That said, some conclusions, such as the implications of single grapheme usage for language teaching, could be better elaborated. For instance, while the article notes the ambiguity introduced by single graphemes, it stops short of proposing specific strategies to address this challenge in educational contexts.

- Critical Awareness of Alternative Perspectives
- The article demonstrates some awareness of alternative approaches, such as the use of diacritics versus digraphs or the trade-offs between modern Latin-based scripts and traditional Arabic Pegon. However, it could engage more deeply with competing paradigms:
  - Competing Linguistic Approaches: The article could consider arguments that prioritize phonological simplicity over precision, particularly in low-resource language communities.
  - Educational Strategies: It might explore alternative pedagogical models that have succeeded in other endangered languages with similar challenges.
  - Cultural Preservation Paradigms: The discussion on Pegon script could benefit from considering frameworks that advocate for revitalizing traditional scripts alongside modern orthographies.

  By more explicitly engaging with these alternative perspectives, the article would demonstrate a stronger critical awareness of the broader debates surrounding orthographic standardization and language preservation.

- Awareness of Premises and Limitations

  The article is generally conscious of its premises, such as the emphasis on education and regional sociocultural factors as primary influences on orthographic practices. It acknowledges the limitations of these premises, particularly in the uneven access to education across Gorontalo. The study also notes the challenges of integrating traditional scripts like Pegon into modern orthographic practices.

  However, the article could further reflect on:
  - The limitations of the respondent sample in fully capturing Gorontalo's linguistic diversity.

- Potential biases in the data collection methods, such as the influence of urban-rural divides or technological access on responses.
- The broader implications of focusing on orthographic standardization over other aspects of language preservation, such as oral traditions.

4. Implications and Applications

The article demonstrates significant relevance and applicability, with practical recommendations and innovative applications. Its original focus on Gorontalo and its sociocultural dynamics breaks new ground in the study of endangered languages. Greater detail in implementation strategies and broader theoretical linkages could elevate its contribution even further.

- Applicability and Relevance

  The article demonstrates both direct and indirect applicability to the fields of language preservation, orthographic standardization, and sociolinguistic education. The discussion of orthographic inconsistencies in Gorontalo is relevant for linguists, educators, and policymakers concerned with endangered languages. The study effectively highlights the practical challenges and sociocultural dynamics influencing orthographic practices, making its findings applicable to similar linguistic contexts globally.

  For example:

  Direct Applicability: The emphasis on digraphs as a practical solution aligns with broader trends in low-resource languages and offers a clear pathway for language documentation.

  Indirect Applicability: The discussion on the Arabic Pegon script contributes to understanding the broader phenomenon of script displacement in post-colonial and globalized settings.

- Practicability of Implications

  The implications are generally practicable and well-grounded. Recommendations for targeted educational programs, community-driven standardization initiatives, and the promotion of digraphs as a primary method for long vowel representation are realistic and actionable. The suggestion to incorporate traditional scripts like Pegon into cultural preservation efforts is also achievable, particularly through heritage education and ceremonial contexts.

  One area for improvement is the clarity of strategies for addressing regional variability in orthographic practices. While the article identifies these differences, it provides limited guidance on how to reconcile them within a unified framework.

- Original Contribution and Intellectual Groundbreaking

  The study makes an original contribution by focusing on Gorontalo, a linguistically understudied region, and by examining the interplay between orthographic practices and sociocultural factors. Its nuanced exploration of how education and regional differences shape orthographic conventions offers fresh insights into language preservation.

  However, its originality could be further enhanced by:

- Proposing more innovative frameworks for integrating modern and traditional orthographies.
- Exploring parallels with other endangered languages that face similar challenges, which would help establish broader theoretical contributions.

➢ Innovative Applications

The article suggests several innovative applications, such as:

- Educational Interventions: Developing region-specific curricula that balance digraphs and diacritics to promote orthographic consistency.
- Digital Tools: Encouraging the integration of diacritic-friendly fonts and keyboards in digital platforms, which could address technological barriers to more precise orthographic practices.
- Cultural Preservation Programs: Revitalizing the Arabic Pegon script through localized heritage initiatives, creating a dual orthography system for cultural and formal uses.
- These applications are promising but would benefit from more detailed implementation strategies, particularly for digital and educational tools.

➢ Broader Applicability and Realizing Its Vision

The findings and recommendations have broader applicability for other minority languages facing orthographic inconsistency and language shift. The principles of balancing simplicity (e.g., digraphs) with phonological precision (e.g., diacritics) can be applied globally, especially in contexts where technological or educational resources are limited.

To realize its vision more widely, the article could:

- Advocate for international collaboration on endangered language documentation.
- Partner with technology developers to create tools that facilitate the use of both traditional and modern orthographies.
- Build frameworks for comparative studies, linking Gorontalo's challenges to other linguistically diverse regions.

5. Quality of Communication

The article is well-structured, clearly focused, and effectively communicates its case to academic and professional audiences. Minor stylistic refinements and a tighter focus in some sections would enhance readability and precision, but professional editing is not strictly necessary.

Suggestions for Specific Improvements

➢ Abstract: While informative, the abstract is dense. Simplifying it slightly would enhance its impact for a wider audience. For instance:

➢ Replace: "The inconsistencies present challenges for language preservation, documentation, and standardization efforts."

➢ With: "These inconsistencies hinder language preservation and standardization."

➢ Methodology: Clarify sections by avoiding repetitive descriptions of data collection. For example, consolidate details about questionnaires and interviews into a single cohesive paragraph.

- Discussion: The section on Arabic Pegon script could benefit from more concise language. Avoid repeating its cultural importance in multiple paragraphs unless introducing new insights.

6. Publication Recommendation & Summary for Author

The article makes a significant contribution to the field of linguistics, particularly in the study of orthographic practices and language preservation for endangered languages. Its focus on Gorontalo provides valuable insights into a linguistically underrepresented region, and the analysis is well-grounded in both empirical data and theoretical frameworks. However, some areas require refinement before the article reaches its full potential for publication.

Summary of Recommended Revisions

- Thematic and Conceptual Refinement:
  - Expand the discussion on sociocultural influences, particularly by integrating concepts like "language ideology" and "orthographic literacy."
  - Engage more deeply with alternative perspectives on orthographic practices and language standardization.
- Methodological Clarity:
  - Streamline the description of research methods to avoid redundancy. For example, consolidate explanations of data collection instruments into a unified narrative.
  - Provide additional context for sociocultural factors influencing regional differences in orthographic choices.
- Implications and Applications:
  - Elaborate on implementation strategies for the proposed recommendations, such as practical steps for integrating traditional scripts or promoting digraph-based standards in education.
  - Explore the broader applicability of findings to other endangered languages facing similar orthographic challenges.
- Communication and Style:
  - Refine sections for conciseness, particularly in the abstract, methodological details, and discussions of theoretical significance.
  - Ensure consistency in terminology and avoid verbose constructions to improve readability.

- **REVISIONS MADE:** Changes made as a consequence of SUGGESTIONS AND COMMENTS or numerical scores.

1. Thematic Focus and Empirical Grounding

   Sociocultural Dynamics: I appreciate the reviewer's acknowledgment of the study's strong thematic focus. I will expand the analysis to delve deeper into the sociocultural factors that influence orthographic preferences, particularly the role of education policies and cultural practices in shaping orthographic conventions.

2. Conceptual Model

   - Sociocultural Factors: I will integrate the suggested concepts like "language ideology," "linguistic accessibility," and "community identity" into the conceptual framework. These additions will enrich

the theoretical foundation and provide a more comprehensive interpretation of the findings.

- Definition and Consistency: I will refine the discussion on sociocultural influences, ensuring that the terms used are well-defined and clearly operationalized in the study.
- Connections to Existing Theory: I will expand the engagement with existing theoretical frameworks, particularly on visual processing theories related to diacritics and cultural shifts related to the Pegon script, to deepen the theoretical underpinnings of the study.

3. Explanatory Logic
   - Historical and Socio-political Context: I will provide a more comprehensive explanation of the historical and socio-political factors that have contributed to the decline of the Arabic Pegon script, beyond globalization and modern education systems.
   - Educational Strategies: I will propose specific strategies for addressing challenges such as the ambiguity of single graphemes in language teaching, providing concrete solutions for educational contexts.
   - Competing Linguistic Approaches: I will explore competing linguistic paradigms, such as the prioritization of phonological simplicity in low-resource contexts, and alternative pedagogical models from other endangered languages.
   - Reflecting on Premises and Limitations: I will further reflect on the limitations of the respondent sample and data collection methods, including urban-rural divides and potential biases, to ensure a more comprehensive and critical discussion.
4. Implications and Applications
   - Global Applicability: I will highlight the broader applicability of the study's findings, drawing parallels with other minority or endangered languages to increase its global relevance.
   - Practical Recommendations: I will revise the manuscript to provide more detailed and actionable recommendations for language preservation, focusing on specific implementation strategies and the use of digital tools.
5. Quality of Communication

   We sincerely appreciate the thoughtful feedback and constructive suggestions. Below, we address each comment and outline the revisions made to the manuscript:

   - Abstract: The abstract has been simplified for improved clarity and accessibility to a wider audience. Specifically, the suggested revision was adopted, replacing the original sentence with: "These inconsistencies hinder language preservation and standardization." This modification ensures concise communication of key points.
   - Methodology: The descriptions of data collection methods have been consolidated into a single cohesive paragraph, removing redundancies and ensuring methodological clarity.
   - Discussion: The section on Arabic Pegon script has been revised to eliminate repetitive statements about its cultural importance. Where references to its significance remain, they are now accompanied by new insights or contextual elaborations.

6. Publication Recommendation & Summary for Author
   - Thematic and Conceptual Refinement:
     - The discussion has been expanded to include sociocultural influences, integrating concepts such as "language ideology" and "orthographic literacy" for a deeper conceptual engagement.
     - Alternative perspectives on orthographic practices and language standardization have been incorporated to provide a more comprehensive analysis.
   - Methodological Clarity:
     - Explanations of data collection instruments have been streamlined into a unified narrative, avoiding repetition and improving readability.
     - Additional context has been provided to elucidate sociocultural factors that contribute to regional differences in orthographic practices.
   - Implications and Applications:
     - Practical steps for implementing the proposed recommendations, such as strategies for integrating traditional scripts or promoting digraph-based standards in education, have been elaborated.
     - The broader applicability of the findings to other endangered languages with similar orthographic challenges has been discussed, enhancing the study's relevance.
   - Communication and Style:
     - Sections throughout the manuscript, particularly the abstract, methodology, and theoretical discussions, have been revised for conciseness and clarity.
     - Terminology has been standardized, and verbose constructions have been minimized to improve readability and maintain consistency.

   We hope these revisions satisfactorily address the reviewer's concerns and enhance the manuscript's quality. We are grateful for the reviewer's detailed feedback, which has significantly contributed to improving our work.

- **REVISIONS NOT MADE:** If SUGGESTIONS AND COMMENTS are not incorporated into your revision, please list and explain with reasons for rejection.
  1. Thematic Focus and Empirical Grounding
     -
  2. Conceptual Model
     -
  3. Explanatory Logic
     -
  4. Implications and Applications
     -
  5. Quality of Communication
     -
  6. Publication Recommendation & Summary for Author
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COMMON GROUND

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   Yes ☐ No ☒

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   Yes ☐ No ☒

5. **AI technologies were used to formulate conclusions from the data collected or concepts discussed in the literature reviewed.**

   Yes ☐ No ☒

6. **AI technologies were used to integrate sources and/or the findings of other scholars into any section of the Author(s) article.**

   Yes ☐ No ☒

7. **AI technologies were used to provide definitions to key terms or concepts.**

   Yes ☐ No ☒

8. **AI technologies were used to formulate practical applications or curate recommendations based on the results presented in the article.**

   Yes ☐ No ☒

9. **AI technologies were used to interpret the results of the study presented in the Author(s) article.**

   Yes ☐ No ☒

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    Yes ☐ No ☒

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   (24 Januari 2025)

Universitas Negeri Gorontalo
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Suleman Bouti <s_bouti@ung.ac.id>

Peer Review - Feedback-On-Feedback - WorkID: 105334

1 pesan

noreply@cgscholar.com <noreply@cgscholar.com> 24 Januari 2025 pukul 05.07
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10. Issuance of Author Certificate
(3 Februari 2025)

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To Whom It May Concern,

I am pleased to announce that the article **Orthographic Inconsistencies in Long Vowel Representation in Gorontalo** by Suleman Bouti has successfully passed the two-way anonymous peer-review process. As a result, the manuscript is accepted for publication and, pending completion of copy editing, will be published in *The International Journal of Communication and Linguistic Studies.*

Founded in 1984, Common Ground Research Networks is committed to building new kinds of knowledge communities, innovative in their media, and forward-thinking in their messages. Our approach to peer review seeks to be inclusive, founded on rigorous and merit-based, two-way anonymous peer-review processes. Common Ground Research Networks takes intellectual integrity very seriously. The publisher, editors, reviewers, and authors agree upon the standards of expected ethical behavior based on the Committee on Publication Ethics (COPE) Core Practices.

Yours Sincerely,

Dr. Phillip Kalantzis-Cope
Chief Social Scientist, Common Ground Research Networks

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11. Style/Formatting Required (3 Februari 2025)

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Style / Formatting - Requirements - WorkID: 105334

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12. Submission of Formatted Article
(10 Februari 2025)

Journal Title
ISSN: ####-#### (Print), ISSN: ####-#### (Online)
Volume #, Issue #
https://doi.org/########################## (Admin use only)

Orthographic Representation of Long Vowels in Gorontalo: A Sociolinguistic Perspective on Tradition and Technology

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Asna Ntelu, Faculty of Letters and Cultures, Universitas Negeri Gorontalo, Indonesia
Muziatun, Faculty of Letters and Cultures, Universitas Negeri Gorontalo, Indonesia
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Received: 11/11/1111; ***Accepted:*** 11/11/1111; ***Published:*** 11/11/1111 (Admin use only)

Abstract: This study examines the orthographic representation of long vowels in Gorontalo, focusing on the sociolinguistic interplay between tradition and technology. Data were collected from 213 respondents across six administrative regions using a mixed-methods approach to explore preferences for single graphemes, digraphs, and diacritics in varied sociocultural and technological contexts. The findings reveal distinct patterns: rural communities primarily retain single graphemes, reflecting oral traditions that emphasize suprasegmental features like rhythm and intonation. In contrast, urban areas adopt digraphs for their practicality in digital communication, while diacritics are predominantly confined to formal educational settings with minimal use in everyday contexts. Technology significantly shapes orthographic preferences, with digital tools promoting modern practices in urban areas, while technological limitations in rural regions sustain traditional systems. Education emerges as a pivotal factor, offering opportunities to reconcile local traditions with contemporary demands through community-based curricula. This study contributes to global discourses on orthographic representation, sociolinguistic identity, and the integration of tradition with technological advancements. The Gorontalo case illustrates how orthographic practices act as cultural artifacts, mediating identity and communication amid rapid social and technological change.

Keywords: *Orthographic representation, long vowels, Gorontalo, sociolinguistics, digital communication*

Introduction

Orthographic systems play a central role in supporting literacy, written communication, and cultural preservation, particularly in the context of minority languages that are vulnerable to the pressures of modernization. As the visual representation of spoken language, orthography enables the relationship between graphemes and phonemes to be translated into consistent and meaningful written forms (Coulmas, 2003; Crystal, 2018). However, for minority languages such as Gorontalo, the challenge of developing a stable and relevant orthographic system remains a pressing issue. In particular, inconsistencies in

orthographic representation, especially of long vowels, pose significant barriers to literacy and intergenerational comprehension.

Long vowels serve an essential phonemic function in Gorontalo, where their presence directly affects word meaning. For instance, the words *tu'o* (vomit) and *tuu'o* (hidden) illustrate how variations in vowel length produce substantial semantic differences. Yet, variability in writing practices—ranging from the use of diacritics, digraphs, or omission of vowel-length markers—frequently generates ambiguity, hindering literacy and reducing clarity in written communication (Ladefoged & Johnson, 2014).

This issue is not unique to Gorontalo. Similar challenges are observed in other minority languages worldwide. For example, in Botswana, orthographic inconsistencies in Khoisan languages have impeded literacy development and weakened cultural recognition (Chebanne, 2016). In Laos, community-based reforms of the Hmong language's orthography successfully established a culturally relevant and phonologically accurate writing system, significantly improving literacy (Dubost et al., 2019). Likewise, in Vietnam, orthographic reforms in the Cham language have demonstrated how accurate phonological representation can strengthen literacy while revitalizing cultural identity.

In Indonesia, orthographic inconsistencies extend beyond Gorontalo to other regional languages, including Sundanese, Bugis, and Minangkabau. Challenges in representing phonological elements, such as vowel length, create obstacles to literacy, particularly among younger generations who are more accustomed to the standardized orthography of Indonesian. For Gorontalo, this issue is exacerbated by the dominance of Indonesian as the national language, which has increasingly replaced many functions of Gorontalo in daily communication.

Socio-cultural dynamics also play a crucial role in shaping orthographic preferences among Gorontalo communities. Research indicates that orthographic conflicts often reflect underlying power hierarchies and language ideologies within societies (Villa & Vosters, 2015). The dominance of Indonesian has not only accelerated the marginalization of Gorontalo but also created a disconnect between traditional practices and modern needs. Conversely, community-based approaches have proven effective in addressing such challenges. For example, Dondelewski and Czopek (2022) highlighted how local community involvement in orthographic reforms can strengthen a sense of ownership over the language and enhance consistency in writing systems.

Although substantial research has explored orthography in minority languages, most studies primarily focus on phonological and morphological descriptions, neglecting in-depth examination of socio-cultural and technological dimensions. Community-based approaches, successfully implemented in orthographic reforms for languages such as Maori in New Zealand and Khoisan in South Africa, have yet to be widely applied to Gorontalo (Chebanne, 2016; Smith & Walsh, 2018). Additionally, while advancements in digital tools

such as local keyboards and AI-powered applications show significant potential to enhance orthographic consistency, their utilization remains minimal in the context of Gorontalo.

The Gorontalo language faces substantial challenges due to orthographic inconsistencies, particularly in the representation of long vowels. The ambiguity arising from varying writing practices poses significant barriers to literacy and written communication. Moreover, the absence of clear orthographic guidelines, limited technological support, and the dominance of Indonesian exacerbate these issues. A holistic approach is therefore required to bridge the gaps between linguistic needs, socio-cultural dynamics, and technological solutions for Gorontalo's writing system.

This study aims to examine the variations in the practice of writing long vowels across different regions of Gorontalo, with a particular focus on the distribution of graphemes, diacritics, and digraphs. Additionally, it seeks to analyze the influence of socio-cultural factors, such as local traditions and generational differences, on the orthographic preferences among Gorontalo communities. Another key objective is to evaluate the impact of digital tools, including localized keyboards and AI-based applications, in enhancing orthographic consistency and helping to preserve the Gorontalo language.

The study addresses three primary aspects. First, from a linguistic perspective, it examines variations in the practice of writing long vowels across Gorontalo. Second, it explores the socio-cultural dimensions of orthographic preferences, considering traditional values, generational differences, and social contexts. Finally, from a technological standpoint, the study evaluates the potential of digital tools to support orthographic consistency and promote language preservation.

Methodology

Research Approach

This study employs a descriptive-exploratory approach with mixed methods, integrating quantitative and qualitative data to provide a comprehensive understanding of the distribution of long vowel orthography in Gorontalo, as well as the sociocultural influences and the impact of technology and education on orthographic consistency. This approach was chosen as it offers deeper insights than relying on a single method alone (Creswell, 2017; Tashakkori & Teddlie, 2010). The descriptive-exploratory design was used to examine existing orthographic patterns, while the mixed methods approach provided flexibility in combining statistical and thematic analyses (Yin, 2018; Flick, 2018).

Research Location and Participants

The research was conducted across six administrative regions in Gorontalo Province: Gorontalo City, Gorontalo Regency, Bone Bolango Regency, Boalemo Regency, Pohuwato Regency, and North Gorontalo Regency. These regions were selected to capture the social, cultural, and geographical diversity relevant to the distribution of orthographic practices. The participants comprised 213 individuals selected through purposive sampling, a method suitable for qualitative research as it allows the selection of participants with in-depth knowledge of the study topic (Lawrence Neuman, 2014; Etikan et al., 2016). Participants included students, teachers, indigenous community members, and digital technology users to capture the dynamics of orthography across domains such as formal education, digital communication, and local cultural traditions (Israel & Hay, 2006).

Data Collection Procedures

Data were collected through surveys, semi-structured interviews, and focus group discussions (FGDs). Triangulation of data was employed to enhance the validity and reliability of the research findings by combining multiple methods and data sources (Denzin, 1978).

1. Survey
   The survey utilized structured questionnaires to document the distribution of long vowel orthographic practices, including diacritics, digraphs, and single graphemes. The survey provided quantitative data to capture general preferences across the six research locations (Bryman, 2016; Field, 2024).
2. Semi-Structured Interviews
   Semi-structured interviews were designed to delve deeper into the sociocultural factors influencing orthographic preferences in Gorontalo. They allowed participants to elaborate on their preferences and the role of technology and education in shaping their orthographic practices (Guest et al., 2011).
3. Focus Group Discussions (FGDs)
   FGDs were conducted to discuss the opportunities and challenges in implementing a dual-system orthographic model. These discussions involved representatives from local communities, teachers, and language practitioners to identify needs and expectations for orthographic reform (Chebanne, 2016; Smith & Walsh, 2018).

Research Instruments

This study employed three types of instruments:

1. Questionnaires: Used to measure the distribution of orthographic usage and participants' perceptions of orthographic consistency within their respective regions (Bryman, 2016; Creswell & Poth, 2016).
2. Interview Guides: Developed to explore social and technological dimensions of orthographic preferences (Lawrence Neuman, 2014; Braun & Clarke, 2006).
3. FGD Guidelines: Designed to analyze collective perspectives on the development and application of a dual-system orthographic model (Israel & Hay, 2006; Creswell & Poth, 2016).

Data Processing and Analysis Procedures

1. Quantitative Analysis

Data from the surveys were analyzed using descriptive statistics to identify the distribution of diacritics, digraphs, and single graphemes across the six research locations. This analysis provided a detailed understanding of orthographic preferences in various social contexts (Field, 2024; Tashakkori & Teddlie, 2010).

2. Qualitative Analysis

Data from interviews and FGDs were analyzed thematically to identify patterns, themes, and relationships relevant to the orthographic preferences of Gorontalo communities. This method is effective for exploring the sociocultural dimensions within the research context (Braun & Clarke, 2006; Guest et al., 2011).

Ethical Considerations

This study adhered to research ethics guidelines by ensuring that all participants were fully informed about the research objectives, methods, and their rights as participants. Participation was voluntary, with written informed consent obtained from all participants. Data confidentiality was strictly maintained throughout the research process and subsequent publication (Israel & Hay, 2006; Babbie, 2020).

Data Reliability and Validity

To ensure data reliability and validity, a pilot test of the questionnaire was conducted with 10 respondents before the main survey. Additionally, methodological triangulation was employed to compare findings from the survey, interviews, and FGDs, enhancing the credibility and trustworthiness of the research results (Denzin, 1978; Lincoln & Guba, 1985).

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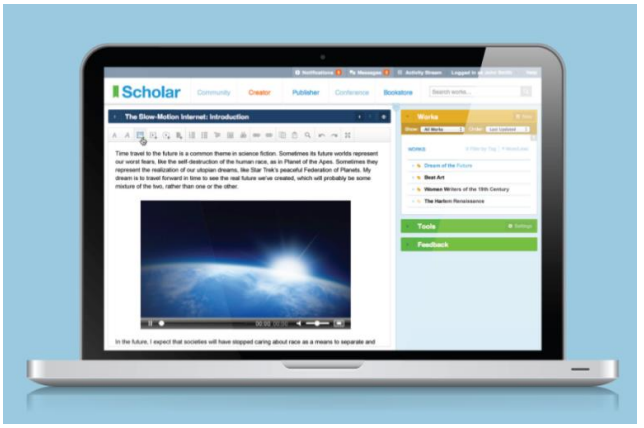

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Results

Distribution of Long Vowel Orthographic Practices

With modernization, social media and digital communication have transformed how communities choose orthographic patterns, particularly in urban areas where efficiency emerges as a dominant factor (Baron, 2010; Tagg & Seargeant, 2021). However, tradition continues to play a significant role in rural areas, reflecting how communication patterns are preserved as a form of cultural identity (Finnegan, 2012; Pauwels, 2016).

The orthographic choices of Gorontalo communities highlight the interplay between cultural traditions, social dynamics, and technological influences. In this context, urban areas such as Gorontalo City exhibit progressive adoption of technology, with digraphs dominating orthographic practices. Conversely, rural areas like North Gorontalo and Boalemo tend to retain single graphemes, aligning with oral traditions rich in suprasegmental elements such as intonation and rhythm (Harrison & Anderson, 2008; Leith, 2020).

These findings are visualized through grouped bar charts and heatmaps, offering comprehensive insights into the distribution of orthographic practices, driving factors, and respondent characteristics across the six regions of Gorontalo (see Figure 1.)

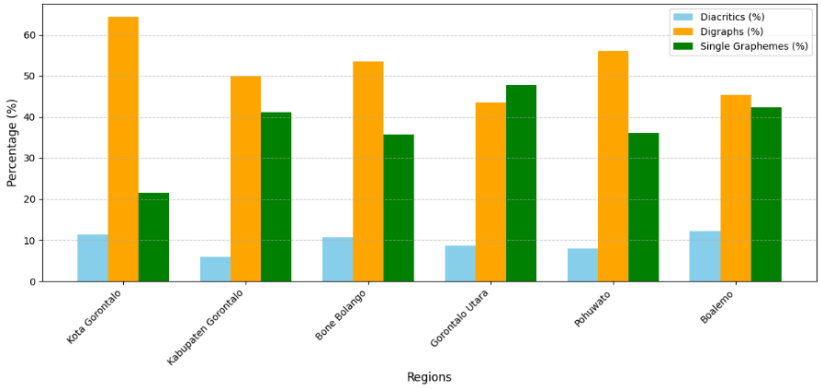

Figure 1: Distribution of Orthographic Practices Across Regions

The grouped bar chart illustrates the distribution of diacritics, digraphs, and single graphemes across six regions in Gorontalo. Gorontalo City demonstrates a dominance of digraphs (64.29%), reflecting the urban community's emphasis on efficiency in digital communication. Digraphs are preferred for their ability to expedite communication without compromising meaning, aligning with the findings of Herring, Stein, and Virtanen (2013), who noted that digital language prioritizes speed and practicality.

In contrast, rural regions like North Gorontalo exhibit a dominance of single graphemes (47.83%), closely tied to oral traditions. As explained by Ong (2013), oral traditions rely heavily on suprasegmental features such as intonation and stress, with written forms functioning merely as complements to spoken language.

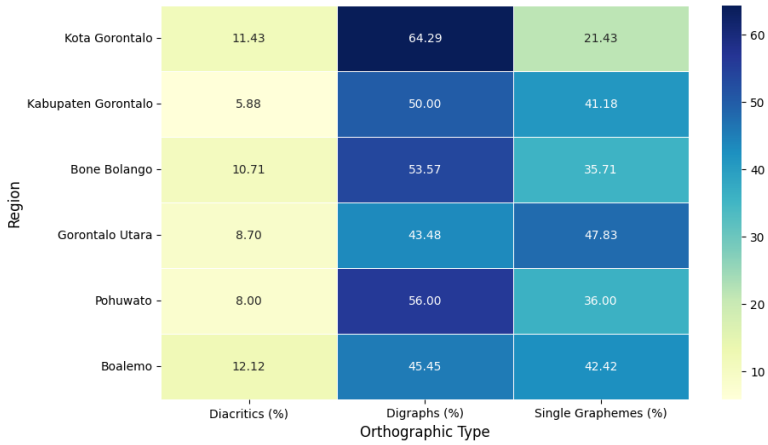

Figure 2: The Heatmap of Orthographic Practice by Region

The heatmap in Figure 2 emphasizes the orthographic variations across different regions. Darker shades in Gorontalo City highlight the dominance of digraphs, while North Gorontalo exhibits a high intensity of single grapheme usage. Regions such as Bone Bolango and Pohuwato display a more balanced distribution between digraphs and single graphemes, reflecting transitional areas that strive to integrate modernity with local traditions. This analysis aligns with Fishman's (2001) theory, which asserts that language patterns reflect the interaction between sociocultural dynamics and technological changes.

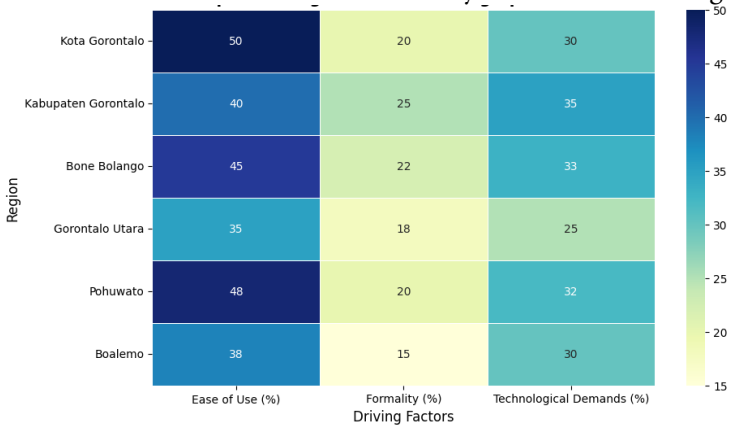

Figure 3: Heatmap of Driving Factors for Orthographic Preferences

The heatmap in Figure 3 illustrates the primary reasons behind orthographic choices across different regions. Gorontalo City stands out with "ease of use" as the dominant factor (50%), aligning with the demand for fast communication in digital spaces (Baron, 2010; Tagg & Seargeant, 2021). In contrast, the "more formal" factor is more prominent in semi-urban areas such as Gorontalo Regency (25%), reflecting the need to adapt orthographic

practices to educational or official documentation contexts. Rural areas like North Gorontalo indicate that the "technological demand" factor has less influence compared to urban regions, consistent with limited access to technology in these areas.

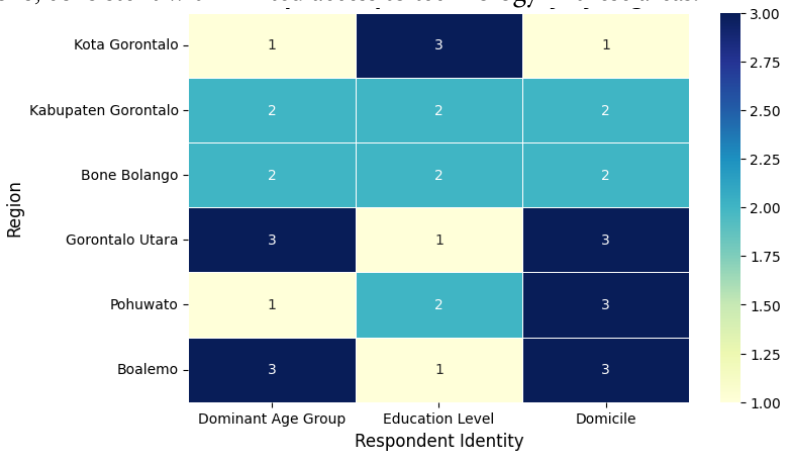

Figure 4: Heatmap of Respondent Identity by Region

The heatmap in Figure 4 provides insights into the social characteristics underlying orthographic preferences. Gorontalo City, dominated by a younger generation with higher education levels and urban residence, tends to favor digraphs as a symbol of modernity. Conversely, rural areas such as Boalemo and North Gorontalo, characterized by older generations with lower education levels and rural residence, prefer single graphemes to preserve traditional patterns. These findings align with Pauwels' (2016) theory, which posits that language and orthographic choices often reflect cultural identity.

The visualization illustrates that Gorontalo's orthographic preferences are shaped by the interaction between tradition, modernization, and social dynamics. Urban areas, such as Gorontalo City, exhibit high adoption of digraphs, driven by efficiency needs and the influence of digital technology. In contrast, rural areas like North Gorontalo maintain single graphemes as part of oral traditions, reflecting a strong cultural identity.

These findings highlight the importance of understanding the social and cultural context when analyzing language patterns. As noted by Crystal (2018) and Harrison and Anderson (2008), modernization does not entirely replace tradition but creates a hybridization of communication patterns. The results have significant implications for educational policies and cultural preservation, particularly in maintaining a balance between technology and tradition amid dynamic social changes.

The Relationship Between Social Context and Orthographic Preferences

The orthographic preferences of Gorontalo communities reflect the complex sociocultural dynamics deeply embedded in their social context. Orthographic patterns, such as digraphs,

single graphemes, and diacritics, not only fulfill practical needs for communication but also illustrate how communities negotiate between modernity and tradition. On one hand, urban areas and social media promote more flexible and efficient orthographic patterns, such as digraphs, to facilitate rapid, technology-based communication. On the other hand, oral traditions and rural regions preserve more traditional patterns, such as single graphemes, which are closely tied to verbal practices and local cultural values (Crystal, 2018; Finnegan, 2012).

Previous studies indicate that modernization often drives shifts in communication patterns, particularly in the context of urbanization and the penetration of digital media (Labov, 2006; Herring, Stein, & Virtanen, 2013). However, in communities rooted in oral traditions, suprasegmental elements such as intonation, rhythm, and stress remain dominant factors in maintaining simple yet meaningful communication patterns (Duranti, 1997; Ladefoged & Johnson, 2014).

This study aims to uncover how differing social contexts influence the orthographic preferences of Gorontalo communities. The following data visualizations provide a detailed depiction of the distribution of orthographic preferences across various social contexts, including social media, urban and rural areas, and oral traditions.

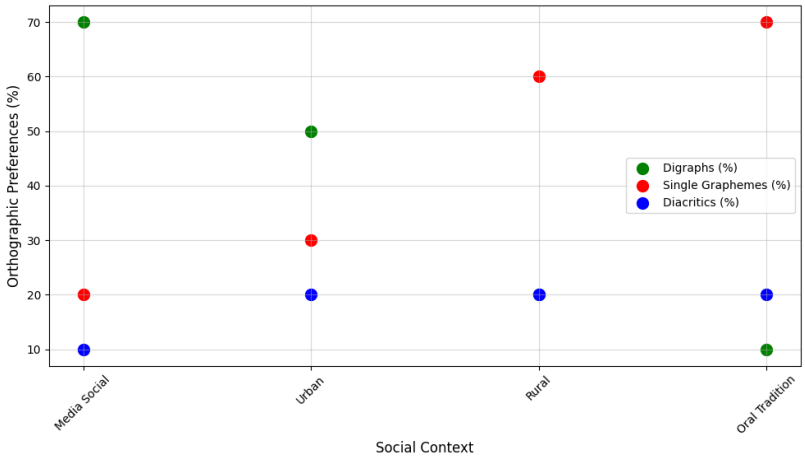

Figure 5: Scatter Plot: Relationship between Social Context and Orthographic Preferences

The distribution of orthographic preferences, as depicted in Figure 5, reveals a clear relationship between social context and the written communication patterns of Gorontalo communities. Within oral traditions, single graphemes dominate with a proportion of 70%, reflecting the importance of suprasegmental elements in preserving message integrity and meaning, particularly in religious texts, folklore, and traditional rituals (Finnegan, 2012; Yule, 2020). Writing in this context functions as a complement to verbal communication rather than as a replacement or primary medium. Digraphs account for only 10% due to

their limited relevance in culturally rooted communication, while diacritics (20%) play a significant role in emphasizing meaning in formal or religious texts.

In rural areas, which remain heavily reliant on oral traditions, a similar pattern is observed, with single graphemes still dominant at 60%. Suprasegmental elements such as intonation and stress continue to influence societal perceptions of writing as a tool that complements verbal communication. Folklore and religious texts, often employing rich verbal communication, make single graphemes more relevant than other patterns. Conversely, digraphs (20%) and diacritics (20%) play more limited roles as they are less aligned with the needs of conservative rural communities (Ong, 2013; Crystal, 2018).

In urban areas, modernization begins to shape more complex and balanced communication patterns. Digraphs dominate at 50%, reflecting the need for efficiency in written communication, particularly in digital technology contexts (Herring, Stein, & Virtanen, 2013; Fishman, 2001). However, single graphemes (30%) and diacritics (20%) remain relevant, particularly in formal domains such as education and official documents. Urbanization introduces a pluralistic interaction between tradition and modernity, where traditional elements are preserved even as the influence of technology grows (Labov, 2006).

In the context of social media, digraphs have the highest usage proportion at 70%, consistent with the platform's emphasis on efficiency and speed in communication. Single graphemes are used at 20%, while diacritics account for 10%, reflecting a shift in orthographic preferences entirely focused on the practical needs of technology-based communication. Social media, as an informal communication space, demonstrates that the suprasegmental elements dominant in oral traditions hold little relevance in digital contexts (Duranti, 1997; Crystal, 2018).

These findings confirm significant differences in orthographic preferences based on the social contexts of Gorontalo. Oral traditions and rural areas maintain single graphemes as the dominant pattern, supported by the strong role of suprasegmental elements in sustaining local cultural continuity. Conversely, urban areas and social media show a preference for digraphs, reflecting the influence of modernization and technology in shaping more flexible and efficient communication patterns.

This study supports the view that tradition and modernity can coexist when a balance is maintained between preserving cultural identity and adapting to social change (Fishman, 2001; Yule, 2020). Although modernity continues to progress, these findings demonstrate that oral traditions remain a vital foundation for Gorontalo communities in navigating complex social dynamics. Orthographic choices not only reflect practical needs but also serve as symbols of cultural adaptation, preserving traditional roots amidst the tides of technological and global changes.

The Relationship Between Education and Orthographic Preferences

The orthographic preferences of Gorontalo communities are closely tied to education levels, reflecting not only practical needs in acquiring written language but also the sociocultural dynamics that shape communication patterns. Orthographic forms such as digraphs, single graphemes, and diacritics are utilized differently across educational stages, illustrating a shift between the need for efficiency, local traditions, and formal precision. Education serves not only as a means of language acquisition but also as a medium that bridges local traditions and modernization, as evidenced by the evolving orthographic preferences across different educational levels (Crystal, 2018; Yule, 2020).

At early educational stages, such as primary school, writing practices focus more on simple comprehension for practical communication. In contrast, at higher levels of education, the need for more formal and complex orthographic forms begins to emerge. This pattern demonstrates that education not only imparts technical writing skills but also shapes how students understand culture and tradition through written language (Finnegan, 2012; Ong, 2013). To visually capture these dynamics, the following scatter plot illustrates the distribution of orthographic preferences across educational levels in Gorontalo.

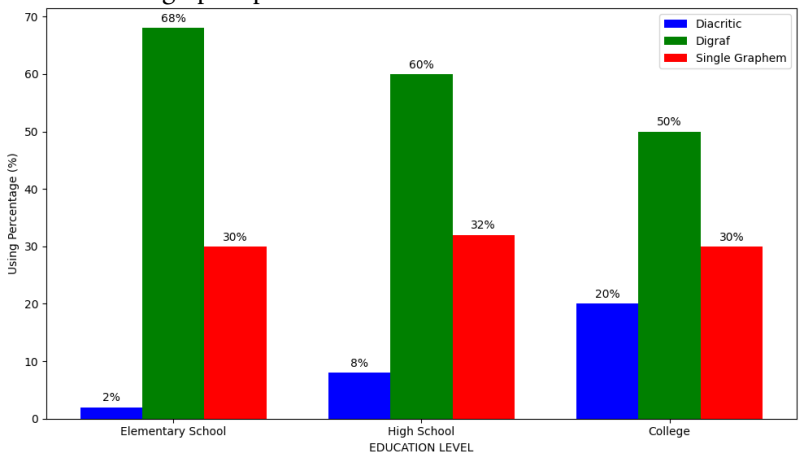

Figure 6: The Comparison among Education Level and Orthographic Preferences in Gorontalo

The data visualization in Figure 6 reveals the distribution of orthographic preferences, illustrating the relationship between educational levels and the use of digraphs, single graphemes, and diacritics. At the primary school level, digraphs dominate with 68%, while single graphemes account for 30%, and diacritics only 2%. The dominance of digraphs reflects an early education approach emphasizing simplicity and efficiency in the learning process. Digraphs are more accessible to primary school students due to their straightforward nature, supporting foundational literacy skills in reading and writing.

Meanwhile, the minimal use of diacritics indicates that linguistic formality is not a primary focus at this stage (Crystal, 2018; Ladefoged & Johnson, 2014).

At the secondary school level, while digraphs remain dominant at 60%, there is an increase in the use of single graphemes to 32% and diacritics to 8%. This pattern suggests that secondary education begins to introduce students to more complex and formal orthographic usage. The rising use of single graphemes may reflect the influence of local traditions, as this pattern is often associated with simplicity and cultural proximity, particularly in religious texts and traditional literature (Finnegan, 2012; Ong, 2013). Conversely, the increased use of diacritics at this level indicates growing exposure to linguistic precision, especially in academic contexts or documents requiring formal expression.

At the higher education level, there is a significant shift in orthographic preferences. Digraphs decline to 50%, while single graphemes remain stable at 30%, and diacritics rise to 20%. This shift suggests that higher education emphasizes precision and formality in written communication. Diacritics become more relevant at this stage, particularly in academic or professional contexts where accuracy and detail are paramount. Meanwhile, digraphs, though still dominant, begin to decline as they do not always align with the demands of more formal communication. The stability of single grapheme usage across educational levels reflects the enduring influence of tradition, even as modernization continues to exert its impact (Labov, 2006; Duranti, 1997).

Orthographic preferences in Gorontalo reflect a complex interplay between educational levels, local traditions, and modernization. At the primary education level, the dominance of digraphs represents the need to simplify early learning, while at secondary and higher education levels, the demand for formality and precision increases, as evidenced by the growing use of diacritics. The consistent use of single graphemes across all educational stages underscores the importance of tradition in shaping the cultural identity of Gorontalo communities.

These findings support the view that education plays a vital role as a bridge between tradition and modernity. Education not only shapes students' technical writing abilities but also influences their perceptions of tradition and formality in written communication. In the context of Gorontalo society, education functions not only as a tool for modernization but also as a medium for preserving local cultural values, ensuring that shifts in communication patterns do not erase key elements of the community's identity (Crystal, 2018; Yule, 2020; Finnegan, 2012; Herring, Stein, & Virtanen, 2013).

Technological Implications for Orthographic Choices

The adoption of technology in Gorontalo communities demonstrates significant variations based on geographical location and social context. These patterns reflect the

dynamics between modernity and tradition, where modern technologies such as social media and digital devices are more widely accepted in urban areas, while simpler technologies remain relevant in rural regions. These variations are not only influenced by generational preferences but are also shaped by technology accessibility, social needs, and levels of urbanization (Crystal, 2018; Fishman, 2001).

Key orthographic tools, such as keyboards, keypads, and touchscreens on digital devices, play a crucial role in shaping orthographic practices in Gorontalo. In the context of digital technology, these features influence the efficiency and ease of using various orthographic methods. This suggests that technological infrastructure is a critical factor in shaping how communities adapt to specific orthographic systems.

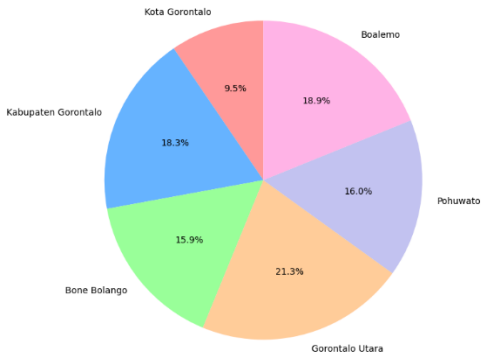

Figure 7: Proportion of Respondents who Mentioned Technology as a Barrier

The pie chart in Figure 7 illustrates variations in perceptions of technology across six regions in Gorontalo. Rural areas, such as North Gorontalo (21.3%) and Boalemo (18.9%), have the highest percentage of respondents perceiving technology as a barrier. This indicates that limited technological infrastructure, low digital literacy, and inadequate training in using digital devices are significant challenges in these regions (Ong, 2013; Finnegan, 2012). These barriers make it more difficult for rural communities to adopt modern technologies, resulting in a continued preference for simpler orthographic methods, such as single graphemes.

In contrast, Gorontalo City has the lowest percentage of respondents (9.5%) viewing technology as a hindrance. Higher rates of technology adaptation in urban areas are supported by better access to digital devices, higher levels of education, and greater exposure to social media. This pattern aligns with the findings of Herring, Stein, and Virtanen (2013), which demonstrate that adequate technological infrastructure fosters efficiency and flexibility in digital communication.

The variation in perceptions of technology across Gorontalo reflects the strong relationship between technological accessibility, infrastructure conditions, and

sociocultural dynamics. In rural areas, technological barriers are more pronounced, sustaining traditional orthographic methods. Conversely, in urban areas like Gorontalo City, higher technological adaptation enables the use of more efficient methods, such as digraphs, in digital communication.

This analysis underscores the importance of improving technological access and digital literacy in rural areas to bridge the technological divide between regions. Moreover, these findings support the perspectives of Crystal (2018) and Pauwels (2016), who argue that technological modernization does not necessarily replace tradition but instead creates adaptive patterns influenced by local sociocultural contexts.

These results are consistent with global patterns, where urban regions tend to adopt technology more quickly due to advanced infrastructure and better access to education (Labov, 2006). Conversely, rural areas, such as North Gorontalo and Boalemo, are often slower to integrate technology due to structural barriers, including high costs and limited resources (Duranti, 1997; Fishman, 2001).

The accompanying scatter plot visualizes the relationship between technological exposure and orthographic preferences, mapping the interaction of location and generational indicators. This scatter plot provides a quantitative perspective on how specific combinations of variables influence orthographic adaptation across different contexts.

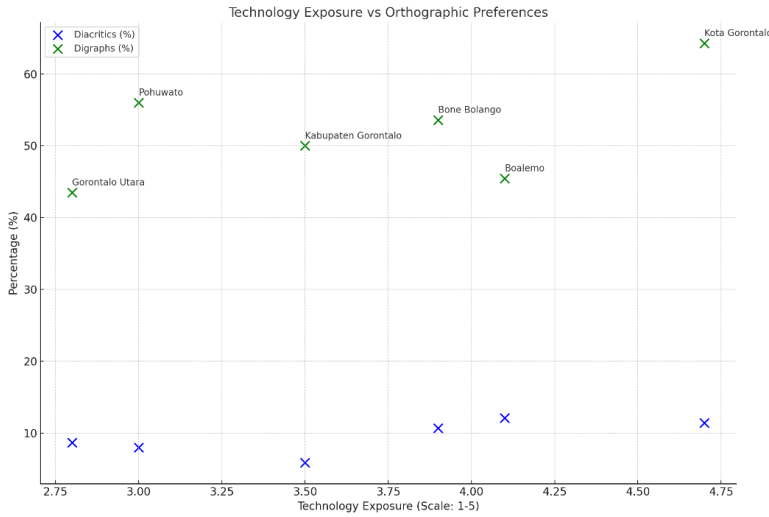

Figure 8: relationship between technological exposure and orthographic preferences

The scatter plot in Figure 8 provides a detailed perspective on the relevance of technology across different regions. The data reveal that areas with high technological exposure, such as Gorontalo City, show a strong preference for modern technology, as indicated by the dominance of digraphs (60%) as the primary orthographic pattern. This

reflects the urban youth's demand for efficiency in technology-based communication (Herring, Stein, & Virtanen, 2013). In contrast, regions such as North Gorontalo and Pohuwato, with lower technological exposure, are more inclined to maintain single graphemes as their main orthographic pattern, highlighting an attachment to tradition and limited access to technology.

The scatter plot also illustrates the relationship between generational relevance and social context. The range of relevance values (Y-axis) indicates that lower values (0–1) are predominantly found in rural areas, where technology is perceived as less relevant for younger generations. For instance, simpler technologies referred to as "rural technologies" dominate in regions like Pohuwato and North Gorontalo. Conversely, higher relevance values (3–5) are observed in urban areas such as Gorontalo City and Gorontalo Regency, where indicators like "social media" and "practicality" align more closely with the needs of the younger generation (Crystal, 2018; Duranti, 1997).

Additionally, the scatter plot highlights transitional regions such as Bone Bolango. This area demonstrates high relevance to mobile technologies (Y = 3–4), reflecting an adaptation phase where traditional elements persist, but modern technology adoption is increasing. Boalemo, on the other hand, shows the highest relevance (Y = 5) for the "practicality" indicator, indicating a strong demand for efficiency among the younger generation (Ong, 2013).

These visualizations complement one another in explaining the relationship between technological exposure, orthographic preferences, and perceptions of technological barriers in Gorontalo. The pie chart reveals that regions with high perceptions of technological barriers tend to have low technological exposure and maintain traditional patterns, as seen in North Gorontalo and Boalemo. In contrast, the scatter plot indicates that regions with high technological exposure, such as Gorontalo City, favor modern patterns like digraphs.
This data confirms that technological exposure acts as a catalyst in shaping orthographic preferences, but the success of technology adoption heavily depends on social factors such as infrastructure, digital literacy, and local cultural values (Herring, Stein, & Virtanen, 2013; Fishman, 2001). While modernization drives technological adoption in urban areas, tradition continues to play a significant role in rural regions, particularly in sustaining patterns such as single graphemes.

These findings highlight how technology adoption in Gorontalo is influenced by the interplay of technological exposure, generational relevance, and social context. Urban areas like Gorontalo City exhibit more progressive technology adoption, with a strong preference for modern orthographic patterns like digraphs. Conversely, rural areas like North Gorontalo and Boalemo tend to preserve traditional patterns, reflecting cultural resistance to rapid technological modernization.

By combining quantitative and qualitative perspectives, this analysis provides deep insights into the technological divide between urban and rural areas. This approach not

only maps the data distribution but also uncovers the social contexts underpinning these patterns. These findings offer a foundation for policy development aimed at reducing technological disparities, considering local needs and the potential for transitioning to modern technologies across Gorontalo's regions.

Discussion

Socio-Cultural Dimensions: Orthography as a Marker of Identity

The orthographic choices of Gorontalo communities reveal a close relationship between cultural practices and identity formation. Rural areas like North Gorontalo exhibit a dominance of single graphemes, reflecting oral traditions that prioritize suprasegmental elements such as intonation and stress over complex visual representations in writing. This underscores the role of orthography as a tool for preserving local cultural heritage, where writing serves as a supplementary rather than primary medium for communication (Finnegan, 2012; Ong, 2013).

The use of single graphemes aligns with findings by Chebanne (2016) on Khoisan communities in Botswana, where simplified orthography helps sustain cultural identity amid marginalization. In Gorontalo, this choice similarly reflects resistance to modern pressures, as highlighted by Villa and Vosters (2015), who argue that orthography often becomes an ideological battleground for preserving local values against global dominance.
In contrast, urban areas like Gorontalo City exhibit a preference for digraphs, symbolizing efficiency and adaptation to modernity. As noted in Hillewaert's (2015) study on social media, the use of digraphs reflects not only communicative functionality but also social identity, showcasing connectivity with digital technology. Globally, this shift illustrates urban communities' efforts to negotiate a modern identity while maintaining respect for cultural roots.

Technology and Orthographic Transformation

Technology serves as a major catalyst for changing orthographic patterns in urban Gorontalo. The preference for digraphs in digital environments reflects how tools like keyboards and touchscreens promoted efficient communication. Herring, Stein, and Virtanen's (2013) study highlights that digitalization often influences societies to prioritize methods of communication that are faster and easier to comprehend.

However, technology also reveals adoption disparities in rural areas. Higher perceptions of technological barriers in North Gorontalo and Boalemo reflect uneven access to technology. This factor reinforces the dominance of simple single graphemes, which better align with technological limitations in these regions (Mlambo, 2024). Here, technology

becomes not only a tool for transformation but also a symbol of social and geographical inequalities.

Nevertheless, the potential of technology to support cultural preservation cannot be overlooked. Weber et al.'s (2023) study on Blackfoot Words demonstrates how digital platforms can archive local languages and support community literacy. A similar approach could be applied in Gorontalo, leveraging technology to document oral traditions and strengthen single grapheme practices as part of local cultural preservation.

Education as a Bridge Between Tradition and Modernity

Education serves as a crucial arena for bridging the gap between tradition and modernity. The use of diacritics in formal institutions reflects efforts to maintain formality in written communication. However, data indicate that diacritics are used less frequently than digraphs or single graphemes, suggesting their limited functionality outside educational contexts.

This case parallels Dubost et al.'s (2019) findings on the Hmong community in Laos, where successful orthographic reforms involved local community engagement to create culturally relevant and functional systems. In Gorontalo, integrating local elements into the educational curriculum could enhance the relevance of formal orthography, such as diacritics, while addressing the needs of rural communities that prioritize single graphemes. Additionally, research by Majorano et al. (2021) highlights that orthographic consistency plays a vital role in supporting literacy. Education can be a strategic tool for improving literacy in Gorontalo through community-based approaches that merge local traditions with modern technology. For example, educational programs that promote digraph use in urban areas and single graphemes in rural areas could bridge these gaps effectively.

Global Reflection: Social, Technological, and Policy Implications

The findings from Gorontalo illustrate how orthography functions as both a tool for cultural preservation and a symbol of modernity, aligning with global trends. Chebanne's (2016) study on African communities shows that simplified orthography can serve as a means of preserving tradition amid marginalization, while Hillewaert (2015) highlights the role of modern orthography in constructing identity within digital spaces.

In the context of Gorontalo, technology has the potential to simultaneously support cultural preservation and enhance communication efficiency. As suggested by Mlambo (2024) and Weber et al. (2023), digitalization can be an inclusive tool for improving literacy in rural areas without compromising traditional values. However, literacy policies must be designed to address technological disparities and ensure that local needs remain a priority.
Community involvement in orthographic development also emerges as a key factor for success, as demonstrated by Dondelewski and Czopek (2022). Similar initiatives in

Gorontalo could include community-based programs to support the use of single graphemes and digraphs, reflecting local needs while reinforcing cultural identity.

Conclusion

The orthographic choices in Gorontalo reflect the dynamic interplay between cultural traditions and modernity, influenced significantly by socio-cultural, technological, and educational factors. Rural areas tend to retain single graphemes as a reflection of oral traditions that emphasize suprasegmental elements and collective cultural identity. Conversely, urban areas demonstrate a dominance of digraphs, highlighting adaptation to digital technology and the demand for communication efficiency.

Education plays a pivotal role in bridging this divide, with significant potential to integrate traditional elements and modern needs through community-based curricula. Technology, while a driver of orthographic transformation in urban areas, continues to face significant challenges in rural regions due to infrastructure limitations and low digital literacy.

Globally, these findings align with similar phenomena in other regions, such as Africa and Southeast Asia, where orthography serves as both a tool for cultural preservation and a symbol of modernity. The results contribute to broader discussions on the relationship between orthography, identity, and social change, emphasizing the importance of community-based approaches in literacy development and orthographic policymaking.

Recommendations

Addressing the findings of this study requires strategic interventions that balance tradition, modernity, and local needs. One critical step is the enhancement of digital literacy in rural areas, where limited technological infrastructure and low digital literacy levels persist. Community-based digital literacy programs tailored to local contexts can serve as a bridge, incorporating region-specific orthographic practices to empower rural communities in adapting to modern communication demands. Alongside this, educational curricula should reflect a dual approach: integrating single graphemes as symbols of cultural identity for rural regions, while promoting digraphs in urban areas to align with technological efficiency and global communication trends.

Further, the development of digital tools holds immense potential in supporting both tradition and modernization. Local governments and cultural organizations could collaborate to create applications or platforms that document oral traditions and reinforce single grapheme practices. Such tools not only preserve cultural identity but also foster literacy and modern communication skills. Community engagement is essential in these efforts; by involving local stakeholders in the design and standardization of orthographic systems, policies and tools can remain culturally relevant and practical. Lastly, continued

research into the intersection of technology, literacy, and cultural preservation is crucial. Future studies should evaluate the long-term effects of technology-driven literacy policies, especially in rural areas, and investigate the sustainability of integrating traditional orthographic practices into modern technological contexts.

Limitations

Despite its contributions, this study has several limitations that should be acknowledged. The research's limited sample size and geographic coverage may constrain the generalizability of its findings to all regions of Gorontalo. Expanding the sample to include a broader demographic would provide more representative insights into orthographic preferences and practices. Furthermore, the study's focus on Gorontalo limits the applicability of its conclusions to other regions in Indonesia, underscoring the need for comparative studies across diverse linguistic and cultural contexts.

Another limitation is the absence of longitudinal data. This research provides a snapshot of orthographic preferences but does not examine how these preferences evolve over time in response to technological, educational, or sociocultural changes. Longitudinal studies could offer valuable insights into the sustainability of shifts in orthographic practices. Additionally, the lack of experimental approaches restricts the study's ability to measure the direct impact of interventions such as digital literacy training or community-based orthographic policies. Incorporating experimental designs in future research would help assess the effectiveness of specific strategies in transforming orthographic preferences.

Finally, while this study highlights the influence of technology on orthographic practices, it does not explore the role of specific technological tools, such as mobile applications or educational software, in shaping these practices. Addressing this gap in future research could provide a more nuanced understanding of the interplay between technology and orthography in Gorontalo and other similar contexts.

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Informed Consent

The authors have obtained informed consent from all participants.

Conflict of Interest

The authors declare that there is no conflict of interest.

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Orthographic Representation of Long Vowels in Gorontalo: A Sociolinguistic Perspective on Tradition and Technology

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Abstract: This study examines the orthographic representation of long vowels in Gorontalo, focusing on the sociolinguistic interplay between tradition and technology. Data were collected from 213 respondents across six administrative regions using a mixed-methods approach to explore preferences for single graphemes, digraphs, and diacritics in varied sociocultural and technological contexts. The findings reveal distinct patterns: rural communities primarily retain single graphemes, reflecting oral traditions that emphasize suprasegmental features like rhythm and intonation. In contrast, urban areas adopt digraphs for their practicality in digital communication, while diacritics are predominantly confined to formal educational settings with minimal use in everyday contexts. Technology significantly shapes orthographic preferences, with digital tools promoting modern practices in urban areas, while technological limitations in rural regions sustain traditional systems. Education emerges as a pivotal factor, offering opportunities to reconcile local traditions with contemporary demands through community-based curricula. This study contributes to global discourses on orthographic representation, sociolinguistic identity, and the integration of tradition with technological advancements. The Gorontalo case illustrates how orthographic practices act as cultural artifacts, mediating identity and communication amid rapid social and technological change.

Keywords: *Orthographic representation, long vowels, Gorontalo, sociolinguistics, digital communication*

Introduction

Orthographic systems play a central role in supporting literacy, written communication, and cultural preservation, particularly in the context of minority languages that are vulnerable to the pressures of modernization. As the visual representation of spoken language, orthography enables the relationship between graphemes and phonemes to be translated into consistent and meaningful written forms (Coulmas 2003; Crystal 2018). However, for minority languages such as Gorontalo, the challenge of developing a stable and relevant orthographic system remains a pressing issue. In particular, inconsistencies in

orthographic representation, especially of long vowels, pose significant barriers to literacy and intergenerational comprehension.

Long vowels serve an essential phonemic function in Gorontalo, where their presence directly affects word meaning. For instance, the words *tu'o* (vomit) and *tuu'o* (hidden) illustrate how variations in vowel length produce substantial semantic differences. Yet, variability in writing practices—ranging from the use of diacritics, digraphs, or omission of vowel-length markers—frequently generates ambiguity, hindering literacy and reducing clarity in written communication (Ladefoged and Johnson 2014).

This issue is not unique to Gorontalo. Similar challenges are observed in other minority languages worldwide. For example, in Botswana, orthographic inconsistencies in Khoisan languages have impeded literacy development and weakened cultural recognition (Chebanne 2016). In Laos, community-based reforms of the Hmong language's orthography successfully established a culturally relevant and phonologically accurate writing system, significantly improving literacy (Dubost et al. 2019). Likewise, in Vietnam, orthographic reforms in the Cham language have demonstrated how accurate phonological representation can strengthen literacy while revitalizing cultural identity.

In Indonesia, orthographic inconsistencies extend beyond Gorontalo to other regional languages, including Sundanese, Bugis, and Minangkabau. Challenges in representing phonological elements, such as vowel length, create obstacles to literacy, particularly among younger generations who are more accustomed to the standardized orthography of Indonesian. For Gorontalo, this issue is exacerbated by the dominance of Indonesian as the national language, which has increasingly replaced many functions of Gorontalo in daily communication.

Socio-cultural dynamics also play a crucial role in shaping orthographic preferences among Gorontalo communities. Research indicates that orthographic conflicts often reflect underlying power hierarchies and language ideologies within societies (Villa and Vosters 2015). The dominance of Indonesian has not only accelerated the marginalization of Gorontalo but also created a disconnect between traditional practices and modern needs. Conversely, community-based approaches have proven effective in addressing such challenges. For example, Dondelewski and Czopek (2022) highlighted how local community involvement in orthographic reforms can strengthen a sense of ownership over the language and enhance consistency in writing systems.

Although substantial research has explored orthography in minority languages, most studies primarily focus on phonological and morphological descriptions, neglecting in-depth examination of socio-cultural and technological dimensions. Community-based approaches, successfully implemented in orthographic reforms for languages such as Maori in New Zealand and Khoisan in South Africa, have yet to be widely applied to Gorontalo (Chebanne 2016; Smith and Walsh 2018). Additionally, while advancements in digital tools

such as local keyboards and AI-powered applications show significant potential to enhance orthographic consistency, their utilization remains minimal in the context of Gorontalo.

The Gorontalo language faces substantial challenges due to orthographic inconsistencies, particularly in the representation of long vowels. The ambiguity arising from varying writing practices poses significant barriers to literacy and written communication. Moreover, the absence of clear orthographic guidelines, limited technological support, and the dominance of Indonesian exacerbate these issues. A holistic approach is therefore required to bridge the gaps between linguistic needs, socio-cultural dynamics, and technological solutions for Gorontalo's writing system.

This study aims to examine the variations in the practice of writing long vowels across different regions of Gorontalo, with a particular focus on the distribution of graphemes, diacritics, and digraphs. Additionally, it seeks to analyze the influence of socio-cultural factors, such as local traditions and generational differences, on the orthographic preferences among Gorontalo communities. Another key objective is to evaluate the impact of digital tools, including localized keyboards and AI-based applications, in enhancing orthographic consistency and helping to preserve the Gorontalo language.

The study addresses three primary aspects. First, from a linguistic perspective, it examines variations in the practice of writing long vowels across Gorontalo. Second, it explores the socio-cultural dimensions of orthographic preferences, considering traditional values, generational differences, and social contexts. Finally, from a technological standpoint, the study evaluates the potential of digital tools to support orthographic consistency and promote language preservation.

Methodology

Research Approach

This study employs a descriptive-exploratory approach with mixed methods, integrating quantitative and qualitative data to provide a comprehensive understanding of the distribution of long vowel orthography in Gorontalo, as well as the sociocultural influences and the impact of technology and education on orthographic consistency. This approach was chosen as it offers deeper insights than relying on a single method alone (Creswell 2017; Tashakkori and Teddlie 2010). The descriptive-exploratory design was used to examine existing orthographic patterns, while the mixed methods approach provided flexibility in combining statistical and thematic analyses (Yin 2018; Flick 2018).

Research Location and Participants

The research was conducted across six administrative regions in Gorontalo Province: Gorontalo City, Gorontalo Regency, Bone Bolango Regency, Boalemo Regency, Pohuwato Regency, and North Gorontalo Regency. These regions were selected to capture the social, cultural, and geographical diversity relevant to the distribution of orthographic practices. The participants comprised 213 individuals selected through purposive sampling, a method suitable for qualitative research as it allows the selection of participants with in-depth knowledge of the study topic (Lawrence Neuman 2014; Etikan et al. 2016). Participants included students, teachers, indigenous community members, and digital technology users to capture the dynamics of orthography across domains such as formal education, digital communication, and local cultural traditions (Israel and Hay 2006).

Data Collection Procedures

Data were collected through surveys, semi-structured interviews, and focus group discussions (FGDs). Triangulation of data was employed to enhance the validity and reliability of the research findings by combining multiple methods and data sources (Denzin, 1978).

1. Survey
   The survey utilized structured questionnaires to document the distribution of long vowel orthographic practices, including diacritics, digraphs, and single graphemes. The survey provided quantitative data to capture general preferences across the six research locations (Bryman, 2016; Field, 2024).
2. Semi-Structured Interviews
   Semi-structured interviews were designed to delve deeper into the sociocultural factors influencing orthographic preferences in Gorontalo. They allowed participants to elaborate on their preferences and the role of technology and education in shaping their orthographic practices (Guest et al. 2011).
3. Focus Group Discussions (FGDs)
   FGDs were conducted to discuss the opportunities and challenges in implementing a dual-system orthographic model. These discussions involved representatives from local communities, teachers, and language practitioners to identify needs and expectations for orthographic reform (Chebanne 2016; Smith and Walsh 2018).

Research Instruments

This study employed three types of instruments:

1. Questionnaires: Used to measure the distribution of orthographic usage and participants' perceptions of orthographic consistency within their respective regions (Bryman 2016; Creswell and Poth 2016).
2. Interview Guides: Developed to explore social and technological dimensions of orthographic preferences (Lawrence Neuman 2014; Braun and Clarke 2006).
3. FGD Guidelines: Designed to analyze collective perspectives on the development and application of a dual-system orthographic model (Israel and Hay 2006; Creswell and Poth 2016).

Data Processing and Analysis Procedures

1. Quantitative Analysis

Data from the surveys were analyzed using descriptive statistics to identify the distribution of diacritics, digraphs, and single graphemes across the six research locations. This analysis provided a detailed understanding of orthographic preferences in various social contexts (Field 2024; Tashakkori and Teddlie 2010).

2. Qualitative Analysis

Data from interviews and FGDs were analyzed thematically to identify patterns, themes, and relationships relevant to the orthographic preferences of Gorontalo communities. This method is effective for exploring the sociocultural dimensions within the research context (Braun and Clarke 2006; Guest et al. 2011).

Ethical Considerations

This study adhered to research ethics guidelines by ensuring that all participants were fully informed about the research objectives, methods, and their rights as participants. Participation was voluntary, with written informed consent obtained from all participants. Data confidentiality was strictly maintained throughout the research process and subsequent publication (Israel and Hay 2006; Babbie 2020).

Data Reliability and Validity

To ensure data reliability and validity, a pilot test of the questionnaire was conducted with 10 respondents before the main survey. Additionally, methodological triangulation was employed to compare findings from the survey, interviews, and FGDs, enhancing the credibility and trustworthiness of the research results (Denzin 1978; Lincoln and Guba, 1985).

Results

Distribution of Long Vowel Orthographic Practices

With modernization, social media and digital communication have transformed how communities choose orthographic patterns, particularly in urban areas where efficiency emerges as a dominant factor (Baron 2010; Tagg and Seargeant 2021). However, tradition continues to play a significant role in rural areas, reflecting how communication patterns are preserved as a form of cultural identity (Finnegan 2012; Pauwels 2016).

The orthographic choices of Gorontalo communities highlight the interplay between cultural traditions, social dynamics, and technological influences. In this context, urban areas such as Gorontalo City exhibit progressive adoption of technology, with digraphs dominating orthographic practices. Conversely, rural areas like North Gorontalo and Boalemo tend to retain single graphemes, aligning with oral traditions rich in suprasegmental elements such as intonation and rhythm (Harrison and Anderson 2008; Leith 2020).

These findings are visualized through grouped bar charts and heatmaps, offering comprehensive insights into the distribution of orthographic practices, driving factors, and respondent characteristics across the six regions of Gorontalo (see Figure 1.)

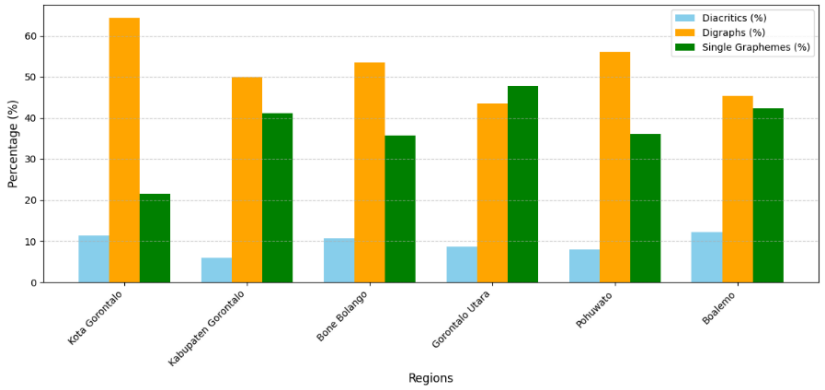

Figure 1: Distribution of Orthographic Practices Across Regions

The grouped bar chart illustrates the distribution of diacritics, digraphs, and single graphemes across six regions in Gorontalo. Gorontalo City demonstrates a dominance of digraphs (64.29%), reflecting the urban community's emphasis on efficiency in digital communication. Digraphs are preferred for their ability to expedite communication without compromising meaning, aligning with the findings of Herring et al. (2013), who noted that digital language prioritizes speed and practicality.

In contrast, rural regions like North Gorontalo exhibit a dominance of single graphemes (47.83%), closely tied to oral traditions. As explained by Ong (2013), oral traditions rely heavily on suprasegmental features such as intonation and stress, with written forms functioning merely as complements to spoken language.

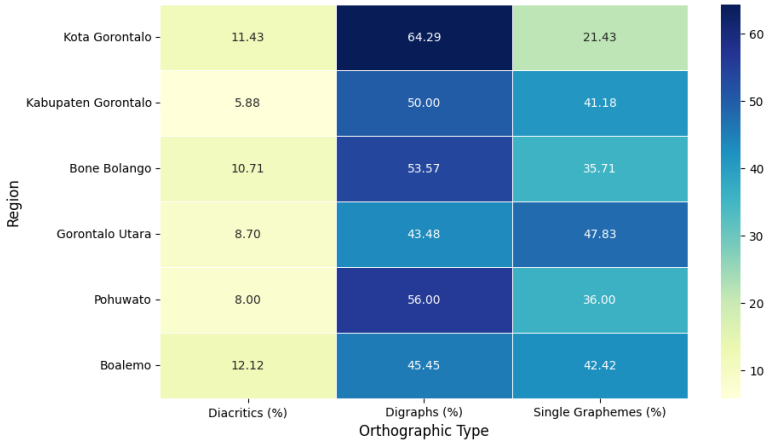

Figure 2: The Heatmap of Orthographic Practice by Region

The heatmap in Figure 2 emphasizes the orthographic variations across different regions. Darker shades in Gorontalo City highlight the dominance of digraphs, while North Gorontalo exhibits a high intensity of single grapheme usage. Regions such as Bone Bolango and Pohuwato display a more balanced distribution between digraphs and single graphemes, reflecting transitional areas that strive to integrate modernity with local traditions. This analysis aligns with Fishman's (2001) theory, which asserts that language patterns reflect the interaction between sociocultural dynamics and technological changes.

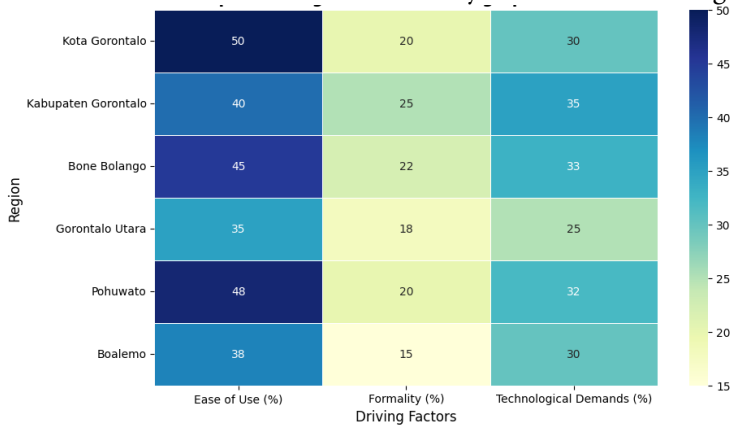

Figure 3: Heatmap of Driving Factors for Orthographic Preferences

The heatmap in Figure 3 illustrates the primary reasons behind orthographic choices across different regions. Gorontalo City stands out with "ease of use" as the dominant factor (50%), aligning with the demand for fast communication in digital spaces (Baron, 2010; Tagg & Seargeant, 2021). In contrast, the "more formal" factor is more prominent in semi-urban areas such as Gorontalo Regency (25%), reflecting the need to adapt orthographic practices to educational or official documentation contexts. Rural areas like North Gorontalo indicate that the "technological demand" factor has less influence compared to urban regions, consistent with limited access to technology in these areas.

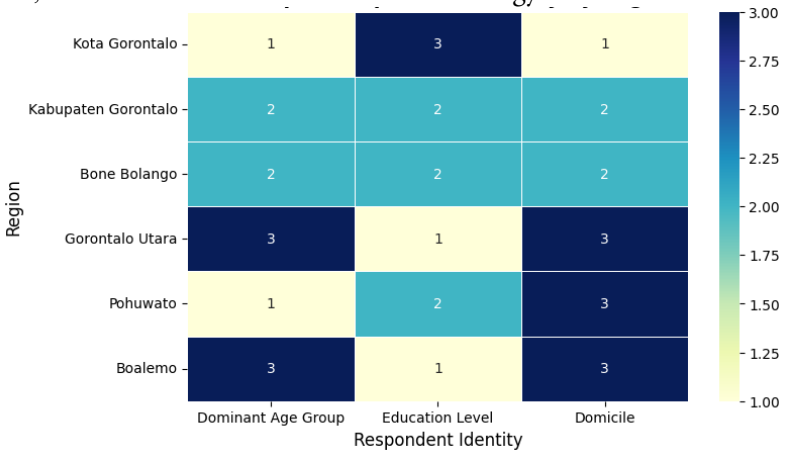

Figure 4: Heatmap of Respondent Identity by Region

The heatmap in Figure 4 provides insights into the social characteristics underlying orthographic preferences. Gorontalo City, dominated by a younger generation with higher education levels and urban residence, tends to favor digraphs as a symbol of modernity. Conversely, rural areas such as Boalemo and North Gorontalo, characterized by older generations with lower education levels and rural residence, prefer single graphemes to preserve traditional patterns. These findings align with Pauwels' (2016) theory, which posits that language and orthographic choices often reflect cultural identity.

The visualization illustrates that Gorontalo's orthographic preferences are shaped by the interaction between tradition, modernization, and social dynamics. Urban areas, such as Gorontalo City, exhibit high adoption of digraphs, driven by efficiency needs and the influence of digital technology. In contrast, rural areas like North Gorontalo maintain single graphemes as part of oral traditions, reflecting a strong cultural identity.

These findings highlight the importance of understanding the social and cultural context when analyzing language patterns. As noted by Crystal (2018) and Harrison and Anderson (2008), modernization does not entirely replace tradition but creates a hybridization of communication patterns. The results have significant implications for

educational policies and cultural preservation, particularly in maintaining a balance between technology and tradition amid dynamic social changes.

The Relationship Between Social Context and Orthographic Preferences

The orthographic preferences of Gorontalo communities reflect the complex sociocultural dynamics deeply embedded in their social context. Orthographic patterns, such as digraphs, single graphemes, and diacritics, not only fulfill practical needs for communication but also illustrate how communities negotiate between modernity and tradition. On one hand, urban areas and social media promote more flexible and efficient orthographic patterns, such as digraphs, to facilitate rapid, technology-based communication. On the other hand, oral traditions and rural regions preserve more traditional patterns, such as single graphemes, which are closely tied to verbal practices and local cultural values (Crystal 2018; Finnegan 2012).

Previous studies indicate that modernization often drives shifts in communication patterns, particularly in the context of urbanization and the penetration of digital media (Labov 2006; Herring et al. 2013). However, in communities rooted in oral traditions, suprasegmental elements such as intonation, rhythm, and stress remain dominant factors in maintaining simple yet meaningful communication patterns (Duranti 1997; Ladefoged and Johnson 2014).

This study aims to uncover how differing social contexts influence the orthographic preferences of Gorontalo communities. The following data visualizations provide a detailed depiction of the distribution of orthographic preferences across various social contexts, including social media, urban and rural areas, and oral traditions.

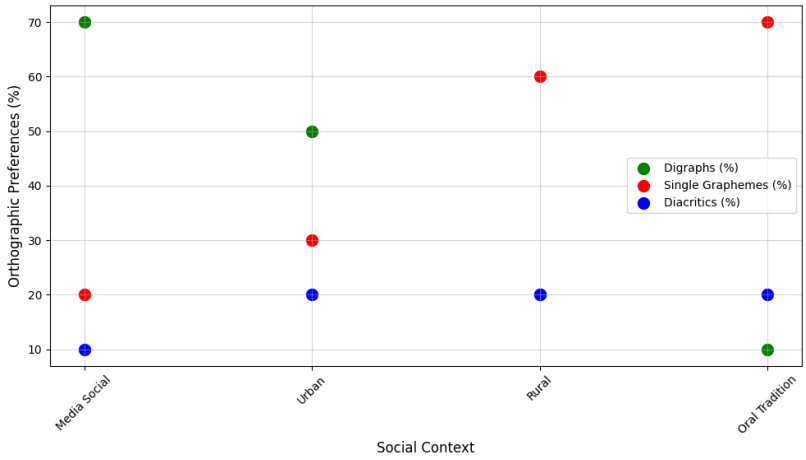

Figure 5: Scatter Plot: Relationship between Social Context and Orthographic Preferences

The distribution of orthographic preferences, as depicted in Figure 5, reveals a clear relationship between social context and the written communication patterns of Gorontalo communities. Within oral traditions, single graphemes dominate with a proportion of 70%, reflecting the importance of suprasegmental elements in preserving message integrity and meaning, particularly in religious texts, folklore, and traditional rituals (Finnegan, 2012; Yule, 2020). Writing in this context functions as a complement to verbal communication rather than as a replacement or primary medium. Digraphs account for only 10% due to their limited relevance in culturally rooted communication, while diacritics (20%) play a significant role in emphasizing meaning in formal or religious texts.

In rural areas, which remain heavily reliant on oral traditions, a similar pattern is observed, with single graphemes still dominant at 60%. Suprasegmental elements such as intonation and stress continue to influence societal perceptions of writing as a tool that complements verbal communication. Folklore and religious texts, often employing rich verbal communication, make single graphemes more relevant than other patterns. Conversely, digraphs (20%) and diacritics (20%) play more limited roles as they are less aligned with the needs of conservative rural communities (Ong 2013; Crystal 2018).

In urban areas, modernization begins to shape more complex and balanced communication patterns. Digraphs dominate at 50%, reflecting the need for efficiency in written communication, particularly in digital technology contexts (Herring et al. 2013; Fishman, 2001). However, single graphemes (30%) and diacritics (20%) remain relevant, particularly in formal domains such as education and official documents. Urbanization introduces a pluralistic interaction between tradition and modernity, where traditional elements are preserved even as the influence of technology grows (Labov 2006).

In the context of social media, digraphs have the highest usage proportion at 70%, consistent with the platform's emphasis on efficiency and speed in communication. Single graphemes are used at 20%, while diacritics account for 10%, reflecting a shift in orthographic preferences entirely focused on the practical needs of technology-based communication. Social media, as an informal communication space, demonstrates that the suprasegmental elements dominant in oral traditions hold little relevance in digital contexts (Duranti 1997; Crystal 2018).

These findings confirm significant differences in orthographic preferences based on the social contexts of Gorontalo. Oral traditions and rural areas maintain single graphemes as the dominant pattern, supported by the strong role of suprasegmental elements in sustaining local cultural continuity. Conversely, urban areas and social media show a preference for digraphs, reflecting the influence of modernization and technology in shaping more flexible and efficient communication patterns.

This study supports the view that tradition and modernity can coexist when a balance is maintained between preserving cultural identity and adapting to social change (Fishman 2001; Yule 2020). Although modernity continues to progress, these findings demonstrate

that oral traditions remain a vital foundation for Gorontalo communities in navigating complex social dynamics. Orthographic choices not only reflect practical needs but also serve as symbols of cultural adaptation, preserving traditional roots amidst the tides of technological and global changes.

The Relationship Between Education and Orthographic Preferences

The orthographic preferences of Gorontalo communities are closely tied to education levels, reflecting not only practical needs in acquiring written language but also the sociocultural dynamics that shape communication patterns. Orthographic forms such as digraphs, single graphemes, and diacritics are utilized differently across educational stages, illustrating a shift between the need for efficiency, local traditions, and formal precision. Education serves not only as a means of language acquisition but also as a medium that bridges local traditions and modernization, as evidenced by the evolving orthographic preferences across different educational levels (Crystal 2018; Yule 2020).

At early educational stages, such as primary school, writing practices focus more on simple comprehension for practical communication. In contrast, at higher levels of education, the need for more formal and complex orthographic forms begins to emerge. This pattern demonstrates that education not only imparts technical writing skills but also shapes how students understand culture and tradition through written language (Finnegan 2012; Ong 2013). To visually capture these dynamics, the following scatter plot illustrates the distribution of orthographic preferences across educational levels in Gorontalo.

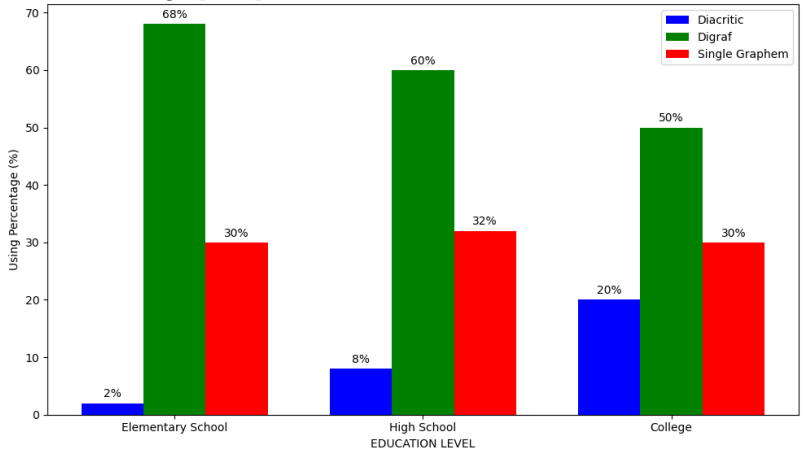

Figure 6: The Comparison among Education Level and Orthographic Preferences in Gorontalo

The data visualization in Figure 6 reveals the distribution of orthographic preferences, illustrating the relationship between educational levels and the use of digraphs, single graphemes, and diacritics. At the primary school level, digraphs dominate with 68%, while single graphemes account for 30%, and diacritics only 2%. The dominance of digraphs

reflects an early education approach emphasizing simplicity and efficiency in the learning process. Digraphs are more accessible to primary school students due to their straightforward nature, supporting foundational literacy skills in reading and writing. Meanwhile, the minimal use of diacritics indicates that linguistic formality is not a primary focus at this stage (Crystal 2018; Ladefoged and Johnson 2014).

At the secondary school level, while digraphs remain dominant at 60%, there is an increase in the use of single graphemes to 32% and diacritics to 8%. This pattern suggests that secondary education begins to introduce students to more complex and formal orthographic usage. The rising use of single graphemes may reflect the influence of local traditions, as this pattern is often associated with simplicity and cultural proximity, particularly in religious texts and traditional literature (Finnegan 2012; Ong 2013). Conversely, the increased use of diacritics at this level indicates growing exposure to linguistic precision, especially in academic contexts or documents requiring formal expression.

At the higher education level, there is a significant shift in orthographic preferences. Digraphs decline to 50%, while single graphemes remain stable at 30%, and diacritics rise to 20%. This shift suggests that higher education emphasizes precision and formality in written communication. Diacritics become more relevant at this stage, particularly in academic or professional contexts where accuracy and detail are paramount. Meanwhile, digraphs, though still dominant, begin to decline as they do not always align with the demands of more formal communication. The stability of single grapheme usage across educational levels reflects the enduring influence of tradition, even as modernization continues to exert its impact (Labov 2006; Duranti 1997).

Orthographic preferences in Gorontalo reflect a complex interplay between educational levels, local traditions, and modernization. At the primary education level, the dominance of digraphs represents the need to simplify early learning, while at secondary and higher education levels, the demand for formality and precision increases, as evidenced by the growing use of diacritics. The consistent use of single graphemes across all educational stages underscores the importance of tradition in shaping the cultural identity of Gorontalo communities.

These findings support the view that education plays a vital role as a bridge between tradition and modernity. Education not only shapes students' technical writing abilities but also influences their perceptions of tradition and formality in written communication. In the context of Gorontalo society, education functions not only as a tool for modernization but also as a medium for preserving local cultural values, ensuring that shifts in communication patterns do not erase key elements of the community's identity (Crystal 2018; Yule 2020; Finnegan 2012; Herring et al. 2013).

Technological Implications for Orthographic Choices

The adoption of technology in Gorontalo communities demonstrates significant variations based on geographical location and social context. These patterns reflect the dynamics between modernity and tradition, where modern technologies such as social media and digital devices are more widely accepted in urban areas, while simpler technologies remain relevant in rural regions. These variations are not only influenced by generational preferences but are also shaped by technology accessibility, social needs, and levels of urbanization (Crystal 2018; Fishman 2001).

Key orthographic tools, such as keyboards, keypads, and touchscreens on digital devices, play a crucial role in shaping orthographic practices in Gorontalo. In the context of digital technology, these features influence the efficiency and ease of using various orthographic methods. This suggests that technological infrastructure is a critical factor in shaping how communities adapt to specific orthographic systems.

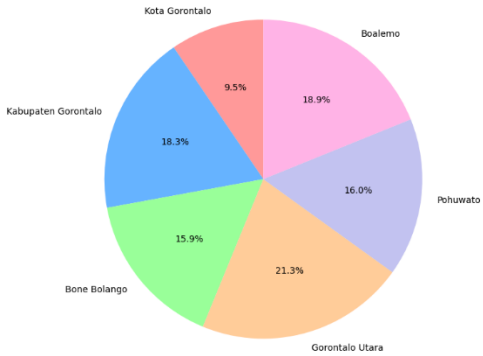

Figure 7: Proportion of Respondents who Mentioned Technology as a Barrier

The pie chart in Figure 7 illustrates variations in perceptions of technology across six regions in Gorontalo. Rural areas, such as North Gorontalo (21.3%) and Boalemo (18.9%), have the highest percentage of respondents perceiving technology as a barrier. This indicates that limited technological infrastructure, low digital literacy, and inadequate training in using digital devices are significant challenges in these regions (Ong 2013; Finnegan 2012). These barriers make it more difficult for rural communities to adopt modern technologies, resulting in a continued preference for simpler orthographic methods, such as single graphemes.

In contrast, Gorontalo City has the lowest percentage of respondents (9.5%) viewing technology as a hindrance. Higher rates of technology adaptation in urban areas are supported by better access to digital devices, higher levels of education, and greater exposure to social media. This pattern aligns with the findings of Herring et al. (2013),

which demonstrate that adequate technological infrastructure fosters efficiency and flexibility in digital communication.

The variation in perceptions of technology across Gorontalo reflects the strong relationship between technological accessibility, infrastructure conditions, and sociocultural dynamics. In rural areas, technological barriers are more pronounced, sustaining traditional orthographic methods. Conversely, in urban areas like Gorontalo City, higher technological adaptation enables the use of more efficient methods, such as digraphs, in digital communication.

This analysis underscores the importance of improving technological access and digital literacy in rural areas to bridge the technological divide between regions. Moreover, these findings support the perspectives of Crystal (2018) and Pauwels (2016), who argue that technological modernization does not necessarily replace tradition but instead creates adaptive patterns influenced by local sociocultural contexts.

These results are consistent with global patterns, where urban regions tend to adopt technology more quickly due to advanced infrastructure and better access to education (Labov 2006). Conversely, rural areas, such as North Gorontalo and Boalemo, are often slower to integrate technology due to structural barriers, including high costs and limited resources (Duranti 1997; Fishman 2001).

The accompanying scatter plot visualizes the relationship between technological exposure and orthographic preferences, mapping the interaction of location and generational indicators. This scatter plot provides a quantitative perspective on how specific combinations of variables influence orthographic adaptation across different contexts.

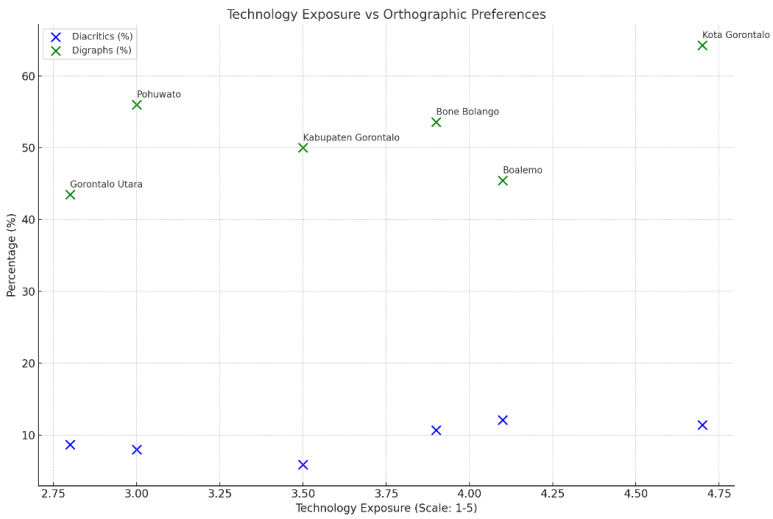

Figure 8: relationship between technological exposure and orthographic preferences

The scatter plot in Figure 8 provides a detailed perspective on the relevance of technology across different regions. The data reveal that areas with high technological exposure, such as Gorontalo City, show a strong preference for modern technology, as indicated by the dominance of digraphs (60%) as the primary orthographic pattern. This reflects the urban youth's demand for efficiency in technology-based communication (Herring et al. 2013). In contrast, regions such as North Gorontalo and Pohuwato, with lower technological exposure, are more inclined to maintain single graphemes as their main orthographic pattern, highlighting an attachment to tradition and limited access to technology.

The scatter plot also illustrates the relationship between generational relevance and social context. The range of relevance values (Y-axis) indicates that lower values (0–1) are predominantly found in rural areas, where technology is perceived as less relevant for younger generations. For instance, simpler technologies referred to as "rural technologies" dominate in regions like Pohuwato and North Gorontalo. Conversely, higher relevance values (3–5) are observed in urban areas such as Gorontalo City and Gorontalo Regency, where indicators like "social media" and "practicality" align more closely with the needs of the younger generation (Crystal 2018; Duranti 1997).

Additionally, the scatter plot highlights transitional regions such as Bone Bolango. This area demonstrates high relevance to mobile technologies (Y = 3–4), reflecting an adaptation phase where traditional elements persist, but modern technology adoption is increasing. Boalemo, on the other hand, shows the highest relevance (Y = 5) for the "practicality" indicator, indicating a strong demand for efficiency among the younger generation (Ong 2013).

These visualizations complement one another in explaining the relationship between technological exposure, orthographic preferences, and perceptions of technological barriers in Gorontalo. The pie chart reveals that regions with high perceptions of technological barriers tend to have low technological exposure and maintain traditional patterns, as seen in North Gorontalo and Boalemo. In contrast, the scatter plot indicates that regions with high technological exposure, such as Gorontalo City, favor modern patterns like digraphs.
This data confirms that technological exposure acts as a catalyst in shaping orthographic preferences, but the success of technology adoption heavily depends on social factors such as infrastructure, digital literacy, and local cultural values (Herring et al. 2013; Fishman 2001). While modernization drives technological adoption in urban areas, tradition continues to play a significant role in rural regions, particularly in sustaining patterns such as single graphemes.

These findings highlight how technology adoption in Gorontalo is influenced by the interplay of technological exposure, generational relevance, and social context. Urban areas like Gorontalo City exhibit more progressive technology adoption, with a strong preference for modern orthographic patterns like digraphs. Conversely, rural areas like North

Gorontalo and Boalemo tend to preserve traditional patterns, reflecting cultural resistance to rapid technological modernization.

By combining quantitative and qualitative perspectives, this analysis provides deep insights into the technological divide between urban and rural areas. This approach not only maps the data distribution but also uncovers the social contexts underpinning these patterns. These findings offer a foundation for policy development aimed at reducing technological disparities, considering local needs and the potential for transitioning to modern technologies across Gorontalo's regions.

Discussion

Socio-Cultural Dimensions: Orthography as a Marker of Identity

The orthographic choices of Gorontalo communities reveal a close relationship between cultural practices and identity formation. Rural areas like North Gorontalo exhibit a dominance of single graphemes, reflecting oral traditions that prioritize suprasegmental elements such as intonation and stress over complex visual representations in writing. This underscores the role of orthography as a tool for preserving local cultural heritage, where writing serves as a supplementary rather than primary medium for communication (Finnegan 2012; Ong 2013).

The use of single graphemes aligns with findings by Chebanne (2016) on Khoisan communities in Botswana, where simplified orthography helps sustain cultural identity amid marginalization. In Gorontalo, this choice similarly reflects resistance to modern pressures, as highlighted by Villa and Vosters (2015), who argue that orthography often becomes an ideological battleground for preserving local values against global dominance.
In contrast, urban areas like Gorontalo City exhibit a preference for digraphs, symbolizing efficiency and adaptation to modernity. As noted in Hillewaert's (2015) study on social media, the use of digraphs reflects not only communicative functionality but also social identity, showcasing connectivity with digital technology. Globally, this shift illustrates urban communities' efforts to negotiate a modern identity while maintaining respect for cultural roots.

Technology and Orthographic Transformation

Technology serves as a major catalyst for changing orthographic patterns in urban Gorontalo. The preference for digraphs in digital environments reflects how tools like keyboards and touchscreens promoted efficient communication. Herring et al. (2013) highlights that digitalization often influences societies to prioritize methods of communication that are faster and easier to comprehend.

However, technology also reveals adoption disparities in rural areas. Higher perceptions of technological barriers in North Gorontalo and Boalemo reflect uneven access to technology. This factor reinforces the dominance of simple single graphemes, which better align with technological limitations in these regions (Mlambo 2024). Here, technology becomes not only a tool for transformation but also a symbol of social and geographical inequalities.

Nevertheless, the potential of technology to support cultural preservation cannot be overlooked. Weber et al.'s (2023) study on Blackfoot Words demonstrates how digital platforms can archive local languages and support community literacy. A similar approach could be applied in Gorontalo, leveraging technology to document oral traditions and strengthen single grapheme practices as part of local cultural preservation.

Education as a Bridge Between Tradition and Modernity

Education serves as a crucial arena for bridging the gap between tradition and modernity. The use of diacritics in formal institutions reflects efforts to maintain formality in written communication. However, data indicate that diacritics are used less frequently than digraphs or single graphemes, suggesting their limited functionality outside educational contexts.

This case parallels Dubost et al.'s (2019) findings on the Hmong community in Laos, where successful orthographic reforms involved local community engagement to create culturally relevant and functional systems. In Gorontalo, integrating local elements into the educational curriculum could enhance the relevance of formal orthography, such as diacritics, while addressing the needs of rural communities that prioritize single graphemes. Additionally, research by Majorano et al. (2021) highlights that orthographic consistency plays a vital role in supporting literacy. Education can be a strategic tool for improving literacy in Gorontalo through community-based approaches that merge local traditions with modern technology. For example, educational programs that promote digraph use in urban areas and single graphemes in rural areas could bridge these gaps effectively.

Global Reflection: Social, Technological, and Policy Implications

The findings from Gorontalo illustrate how orthography functions as both a tool for cultural preservation and a symbol of modernity, aligning with global trends. Chebanne's (2016) study on African communities shows that simplified orthography can serve as a means of preserving tradition amid marginalization, while Hillewaert (2015) highlights the role of modern orthography in constructing identity within digital spaces.

In the context of Gorontalo, technology has the potential to simultaneously support cultural preservation and enhance communication efficiency. As suggested by Mlambo (2024) and Weber et al. (2023), digitalization can be an inclusive tool for improving literacy

in rural areas without compromising traditional values. However, literacy policies must be designed to address technological disparities and ensure that local needs remain a priority. Community involvement in orthographic development also emerges as a key factor for success, as demonstrated by Dondelewski and Czopek (2022). Similar initiatives in Gorontalo could include community-based programs to support the use of single graphemes and digraphs, reflecting local needs while reinforcing cultural identity.

Conclusion

The orthographic choices in Gorontalo reflect the dynamic interplay between cultural traditions and modernity, influenced significantly by socio-cultural, technological, and educational factors. Rural areas tend to retain single graphemes as a reflection of oral traditions that emphasize suprasegmental elements and collective cultural identity. Conversely, urban areas demonstrate a dominance of digraphs, highlighting adaptation to digital technology and the demand for communication efficiency.

Education plays a pivotal role in bridging this divide, with significant potential to integrate traditional elements and modern needs through community-based curricula. Technology, while a driver of orthographic transformation in urban areas, continues to face significant challenges in rural regions due to infrastructure limitations and low digital literacy.

Globally, these findings align with similar phenomena in other regions, such as Africa and Southeast Asia, where orthography serves as both a tool for cultural preservation and a symbol of modernity. The results contribute to broader discussions on the relationship between orthography, identity, and social change, emphasizing the importance of community-based approaches in literacy development and orthographic policymaking.

Recommendations

Addressing the findings of this study requires strategic interventions that balance tradition, modernity, and local needs. One critical step is the enhancement of digital literacy in rural areas, where limited technological infrastructure and low digital literacy levels persist. Community-based digital literacy programs tailored to local contexts can serve as a bridge, incorporating region-specific orthographic practices to empower rural communities in adapting to modern communication demands. Alongside this, educational curricula should reflect a dual approach: integrating single graphemes as symbols of cultural identity for rural regions, while promoting digraphs in urban areas to align with technological efficiency and global communication trends.

Further, the development of digital tools holds immense potential in supporting both tradition and modernization. Local governments and cultural organizations could collaborate to create applications or platforms that document oral traditions and reinforce

single grapheme practices. Such tools not only preserve cultural identity but also foster literacy and modern communication skills. Community engagement is essential in these efforts; by involving local stakeholders in the design and standardization of orthographic systems, policies and tools can remain culturally relevant and practical. Lastly, continued research into the intersection of technology, literacy, and cultural preservation is crucial. Future studies should evaluate the long-term effects of technology-driven literacy policies, especially in rural areas, and investigate the sustainability of integrating traditional orthographic practices into modern technological contexts.

Limitations

Despite its contributions, this study has several limitations that should be acknowledged. The research's limited sample size and geographic coverage may constrain the generalizability of its findings to all regions of Gorontalo. Expanding the sample to include a broader demographic would provide more representative insights into orthographic preferences and practices. Furthermore, the study's focus on Gorontalo limits the applicability of its conclusions to other regions in Indonesia, underscoring the need for comparative studies across diverse linguistic and cultural contexts.

Another limitation is the absence of longitudinal data. This research provides a snapshot of orthographic preferences but does not examine how these preferences evolve over time in response to technological, educational, or sociocultural changes. Longitudinal studies could offer valuable insights into the sustainability of shifts in orthographic practices. Additionally, the lack of experimental approaches restricts the study's ability to measure the direct impact of interventions such as digital literacy training or community-based orthographic policies. Incorporating experimental designs in future research would help assess the effectiveness of specific strategies in transforming orthographic preferences.

Finally, while this study highlights the influence of technology on orthographic practices, it does not explore the role of specific technological tools, such as mobile applications or educational software, in shaping these practices. Addressing this gap in future research could provide a more nuanced understanding of the interplay between technology and orthography in Gorontalo and other similar contexts.

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Informed Consent

The authors have obtained informed consent from all participants.

Conflict of Interest

The authors declare that there is no conflict of interest.

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Original Research

Orthographic Representation of Long Vowels in Gorontalo: A Sociolinguistic Perspective on Tradition and Technology

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Abstract: This study examines the orthographic representation of long vowels in Gorontalo, focusing on the sociolinguistic interplay between tradition and technology. Data were collected from 213 respondents across six administrative regions using a mixed-methods approach to explore preferences for single graphemes, digraphs, and diacritics in varied sociocultural and technological contexts. The findings reveal distinct patterns: rural communities primarily retain single graphemes, reflecting oral traditions that emphasize suprasegmental features like rhythm and intonation. In contrast, urban areas adopt digraphs for their practicality in digital communication, while diacritics are predominantly confined to formal educational settings with minimal use in everyday contexts. Technology significantly shapes orthographic preferences, with digital tools promoting modern practices in urban areas, while technological limitations in rural regions sustain traditional systems. Education emerges as a pivotal factor, offering opportunities to reconcile local traditions with contemporary demands through community-based curricula. This study contributes to global discourses on orthographic representation, sociolinguistic identity, and the integration of tradition with technological advancements. The Gorontalo case illustrates how orthographic practices act as cultural artifacts, mediating identity and communication amid rapid social and technological change.

Keywords: *Orthographic Representation, Long Vowels, Gorontalo, Sociolinguistics, Digital Communication*
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Introduction

Orthographic systems play a central role in supporting literacy, written communication, and cultural preservation, particularly in the context of minority languages that are vulnerable to the pressures of modernization. As the visual representation of spoken language, orthography enables the relationship between graphemes and phonemes to be translated into consistent and meaningful written forms (Coulmas 2003; Crystal 2018). However, for minority languages such as Gorontalo, the challenge of developing a stable and relevant orthographic system remains a pressing issue. In particular, inconsistencies in orthographic representation,

especially of long vowels, pose significant barriers to literacy and intergenerational comprehension.

Long vowels serve an essential phonemic function in Gorontalo, where their presence directly affects word meaning. For instance, the words *tu'o* (vomit) and *tuu'o* (hidden) illustrate how variations in vowel length produce substantial semantic differences. Nevertheless, variability in writing practices—ranging from the use of diacritics, digraphs, or omission of vowel-length markers—frequently generates ambiguity, hindering literacy, and reducing clarity in written communication (Ladefoged and Johnson 2014).

This issue is not unique to Gorontalo. Similar challenges are observed in other minority languages worldwide. For example, in Botswana, orthographic inconsistencies in Khoisan languages have impeded literacy development and weakened cultural recognition (Chebanne 2016). In Laos, community-based reforms of the Hmong language's orthography successfully established a culturally relevant and phonologically accurate writing system, significantly improving literacy (Dubost et al. 2019). Likewise, in Vietnam, orthographic reforms in the Cham language have demonstrated how accurate phonological representation can strengthen literacy while revitalizing cultural identity.

In Indonesia, orthographic inconsistencies extend beyond Gorontalo to other regional languages, including Sundanese, Bugis, and Minangkabau. Challenges in representing phonological elements, such as vowel length, create obstacles to literacy, particularly among younger generations who are more accustomed to the standardized orthography of Indonesian. For Gorontalo, this issue is exacerbated by the dominance of Indonesian as the national language, which has increasingly replaced many functions of Gorontalo in daily communication.

Sociocultural dynamics also play a crucial role in shaping orthographic preferences among Gorontalo communities. Research indicates that orthographic conflicts often reflect underlying power hierarchies and language ideologies within societies (Villa and Vosters 2015). The dominance of Indonesian has not only accelerated the marginalization of Gorontalo but also created a disconnect between traditional practices and modern needs. Conversely, community-based approaches have proven effective in addressing such challenges. For example, Dondelewski and Czopek (2022) highlighted how local community involvement in orthographic reforms can strengthen a sense of ownership over the language and enhance consistency in writing systems.

Although substantial research has explored orthography in minority languages, most studies primarily focus on phonological and morphological descriptions, neglecting in-depth examination of sociocultural and technological dimensions. Community-based approaches, successfully implemented in orthographic reforms for languages such as Maori in New Zealand and Khoisan in South Africa, have yet to be widely applied to Gorontalo (Chebanne 2016; Smith and Walsh 2018 [Please add to reference list.]). Additionally, while advancements in digital tools such as local keyboards and artificial intelligence (AI)–powered

applications show significant potential to enhance orthographic consistency, their utilization remains minimal in the context of Gorontalo.

The Gorontalo language faces substantial challenges due to orthographic inconsistencies, particularly in the representation of long vowels. The ambiguity arising from varying writing practices poses significant barriers to literacy and written communication. Moreover, the absence of clear orthographic guidelines, limited technological support, and the dominance of Indonesian exacerbate these issues. A holistic approach is therefore required to bridge the gaps between linguistic needs, sociocultural dynamics, and technological solutions for Gorontalo's writing system.

This study aims to examine the variations in the practice of writing long vowels across different regions of Gorontalo, with a particular focus on the distribution of graphemes, diacritics, and digraphs. Additionally, it seeks to analyze the influence of sociocultural factors, such as local traditions and generational differences, on the orthographic preferences among Gorontalo communities. Another key objective is to evaluate the impact of digital tools, including localized keyboards and AI-based applications, in enhancing orthographic consistency and helping to preserve the Gorontalo language.

The study addresses three primary aspects. First, from a linguistic perspective, it examines variations in the practice of writing long vowels across Gorontalo. Second, it explores the sociocultural dimensions of orthographic preferences, considering traditional values, generational differences, and social contexts. Finally, from a technological standpoint, the study evaluates the potential of digital tools to support orthographic consistency and promote language preservation.

Methodology

Research Approach

This study employs a descriptive–exploratory approach with mixed methods, integrating quantitative and qualitative data to provide a comprehensive understanding of the distribution of long vowel orthography in Gorontalo, as well as the sociocultural influences and the impact of technology and education on orthographic consistency. This approach was chosen, as it offers deeper insights than relying on a single method alone (Creswell and Creswell 2017 [Edited to match reference list. Please confirm.]; Tashakkori and Teddlie 2010). The descriptive–exploratory design was used to examine existing orthographic patterns, while the mixed-methods approach provided flexibility in combining statistical and thematic analyses (Yin 2018; Flick 2018).

Research Location and Participants

The research was conducted across six administrative regions in Gorontalo Province: Gorontalo City, Gorontalo Regency, Bone Bolango Regency, Boalemo Regency, Pohuwato Regency, and North Gorontalo Regency. These regions were selected to capture the social, cultural, and geographical diversity relevant to the distribution of orthographic practices. The participants comprised 213 individuals selected through purposive sampling, a method suitable for qualitative research as it allows the selection of participants with in-depth knowledge of the study topic (Lawrence Neuman 2014; Etikan et al. 2016). Participants included students, teachers, indigenous community members, and digital technology users to capture the dynamics of orthography across domains such as formal education, digital communication, and local cultural traditions (Israel and Hay 2006).

Data Collection Procedures

Data were collected through surveys, semi-structured interviews, and focus group discussions (FGDs). Triangulation of data was employed to enhance the validity and reliability of the research findings by combining multiple methods and data sources (Denzin 2017). [Edited to match reference list. Please confirm.]

1. Survey: The survey utilized structured questionnaires to document the distribution of long vowel orthographic practices, including diacritics, digraphs, and single graphemes. The survey provided quantitative data to capture general preferences across the six research locations (Bryman 2016; Field 2024).
2. Semi-Structured Interviews: Semi-structured interviews were designed to delve deeper into the sociocultural factors influencing orthographic preferences in Gorontalo. They allowed participants to elaborate on their preferences and the role of technology and education in shaping their orthographic practices (Guest et al. 2011).
3. Focus Group Discussions: Focus Group Discussions (FGDs) were conducted to discuss the opportunities and challenges in implementing a dual-system orthographic model. These discussions involved representatives from local communities, teachers, and language practitioners to identify needs and expectations for orthographic reform (Chebanne 2016; Smith and Walsh 2018).

Research Instruments

This study employed three types of instruments:

1. Questionnaires: Used to measure the distribution of orthographic usage and participants' perceptions of orthographic consistency within their respective regions (Bryman 2016; Creswell and Poth 2016).

2. Interview Guides: Developed to explore social and technological dimensions of orthographic preferences (Lawrence Neuman 2014; Braun and Clarke 2006).
3. FGD Guidelines: Designed to analyze collective perspectives on the development and application of a dual-system orthographic model (Israel and Hay 2006; Creswell and Poth 2016).

Data Processing and Analysis Procedures

[please introduce this list]

1. Quantitative Analysis: Data from the surveys were analyzed using descriptive statistics to identify the distribution of diacritics, digraphs, and single graphemes across the six research locations. This analysis provided a detailed understanding of orthographic preferences in various social contexts (Field 2024; Tashakkori and Teddlie 2010).
2. Qualitative Analysis: Data from interviews and FGDs were analyzed thematically to identify patterns, themes, and relationships relevant to the orthographic preferences of Gorontalo communities. This method is effective for exploring the sociocultural dimensions within the research context (Braun and Clarke 2006; Guest et al. 2011).

Ethical Considerations

This study adhered to research ethics guidelines by ensuring that all participants were fully informed about the research objectives, methods, and their rights as participants. Participation was voluntary, with written informed consent obtained from all participants. Data confidentiality was strictly maintained throughout the research process and subsequent publication (Israel and Hay 2006; Babbie 2020).

Data Reliability and Validity

To ensure data reliability and validity, a pilot test of the questionnaire was conducted with ten respondents before the main survey. Additionally, methodological triangulation was employed to compare findings from the survey, interviews, and FGDs, enhancing the credibility and trustworthiness of the research results (Denzin 2017 [Edited to match reference list. Please confirm.]; Lincoln and Guba 1985).

Results

Distribution of Long Vowel Orthographic Practices

With modernization, social media and digital communication have transformed how communities choose orthographic patterns, particularly in urban areas where efficiency

emerges as a dominant factor (Baron 2010; Tagg and Seargeant 2021 [Please add to reference list.]). However, tradition continues to play a significant role in rural areas, reflecting how communication patterns are preserved as a form of cultural identity (Finnegan 2012; Pauwels 2016).

The orthographic choices of Gorontalo communities highlight the interplay between cultural traditions, social dynamics, and technological influences. In this context, urban areas such as Gorontalo City exhibit progressive adoption of technology, with digraphs dominating orthographic practices. Conversely, rural areas like North Gorontalo and Boalemo tend to retain single graphemes, aligning with oral traditions rich in suprasegmental elements such as intonation and rhythm (Harrison and Anderson 2008; Leith 2016 [Edited to match reference list. Please confirm.]).

These findings are visualized through grouped bar charts and heatmaps, offering comprehensive insights into the distribution of orthographic practices, driving factors, and respondent characteristics across the six regions of Gorontalo (see Figure 1).

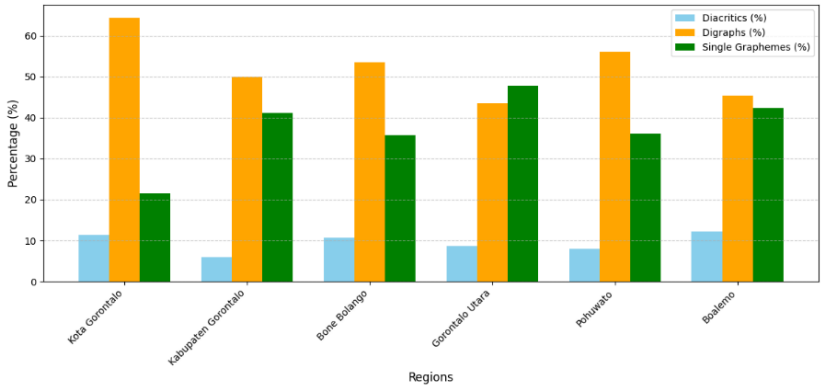

Figure 1: Distribution of Orthographic Practices Across Regions

The grouped bar chart illustrates the distribution of diacritics, digraphs, and single graphemes across six regions in Gorontalo. Gorontalo City demonstrates a dominance of digraphs (64.29%), reflecting the urban community's emphasis on efficiency in digital communication. Digraphs are preferred for their ability to expedite communication without compromising meaning, aligning with the findings of Herring et al. (2013), who noted that digital language prioritizes speed and practicality.

In contrast, rural regions like North Gorontalo exhibit a dominance of single graphemes (47.83%), closely tied to oral traditions. As explained by Ong and Hartley (2013) [Edited to match reference list. Please confirm.], oral traditions rely heavily on suprasegmental features such as intonation and stress, with written forms functioning merely as complements to spoken language.

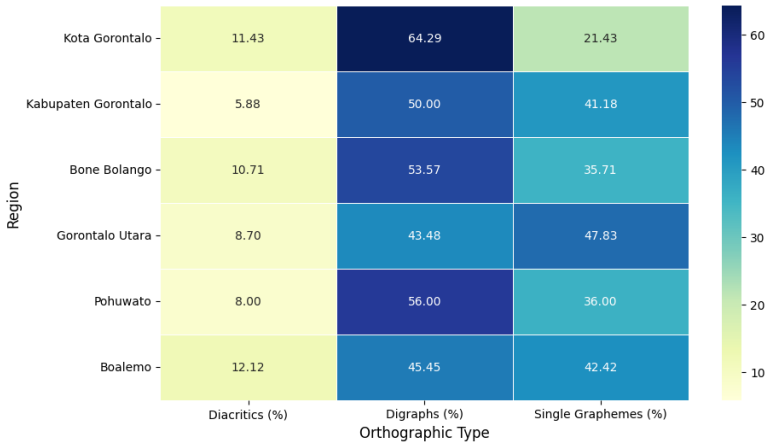

Figure 2: The Heatmap of Orthographic Practice by Region

The heatmap in Figure 2 emphasizes the orthographic variations across different regions. Darker shades in Gorontalo City highlight the dominance of digraphs, while North Gorontalo exhibits a high intensity of single grapheme usage. Regions such as Bone Bolango and Pohuwato display a more balanced distribution between digraphs and single graphemes, reflecting transitional areas that strive to integrate modernity with local traditions. This analysis aligns with Fishman's (2001) theory, which asserts that language patterns reflect the interaction between sociocultural dynamics and technological changes.

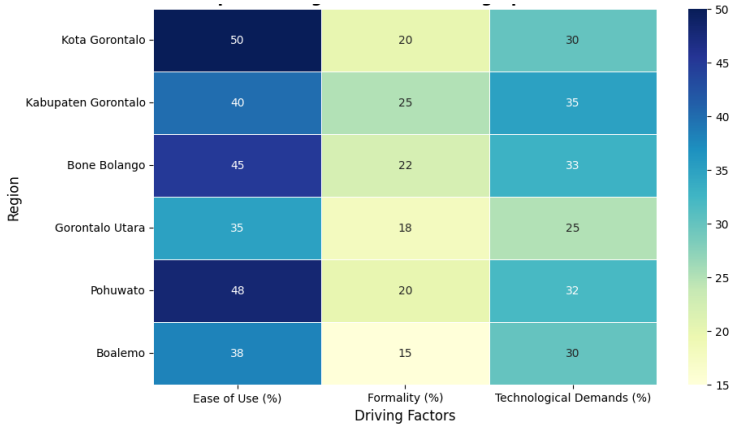

Figure 3: Heatmap of Driving Factors for Orthographic Preferences

The heatmap in Figure 3 illustrates the primary reasons behind orthographic choices across different regions. Gorontalo City stands out with "ease of use" as the dominant factor (50%), aligning with the demand for fast communication in digital spaces (Baron 2010; Tagg and Seargeant 2021). In contrast, the "more formal" factor is more prominent in semi-urban areas such as Gorontalo Regency (25%), reflecting the need to adapt orthographic practices

to educational or official documentation contexts. Rural areas like North Gorontalo indicate that the "technological demand" factor has less influence compared to urban regions, consistent with limited access to technology in these areas.

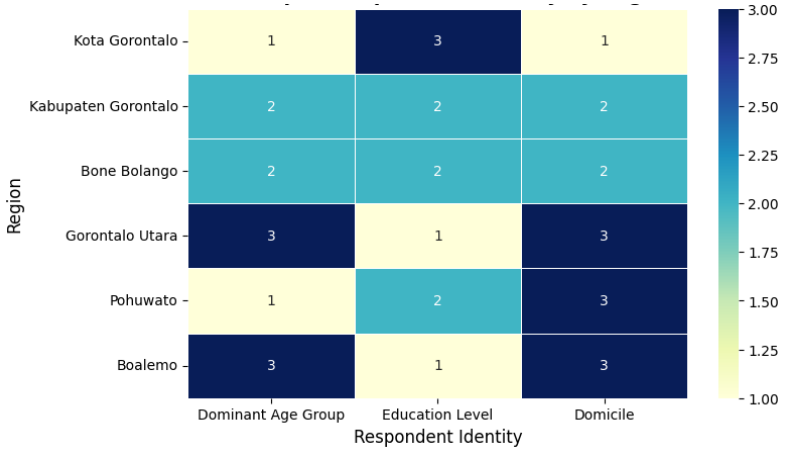

Figure 4: Heatmap of Respondent Identity by Region

The heatmap in Figure 4 provides insights into the social characteristics underlying orthographic preferences. Gorontalo City, dominated by a younger generation with higher education levels and urban residence, tends to favor digraphs as a symbol of modernity. Conversely, rural areas such as Boalemo and North Gorontalo, characterized by older generations with lower education levels and rural residence, prefer single graphemes to preserve traditional patterns. These findings align with Pauwels' (2016) theory, which posits that language and orthographic choices often reflect cultural identity.

The visualization illustrates that Gorontalo's orthographic preferences are shaped by the interaction between tradition, modernization, and social dynamics. Urban areas, such as Gorontalo City, exhibit high adoption of digraphs, driven by efficiency needs and the influence of digital technology. In contrast, rural areas like North Gorontalo maintain single graphemes as part of oral traditions, reflecting a strong cultural identity.

These findings highlight the importance of understanding the social and cultural context when analyzing language patterns. As noted by Crystal (2018) and Harrison and Anderson (2008), modernization does not entirely replace tradition but creates a hybridization of communication patterns. The results have significant implications for educational policies and cultural preservation, particularly in maintaining a balance between technology and tradition amid dynamic social changes.

The Relationship Between Social Context and Orthographic Preferences

The orthographic preferences of Gorontalo communities reflect the complex sociocultural dynamics deeply embedded in their social context. Orthographic patterns, such as digraphs, single graphemes, and diacritics, not only fulfill practical needs for communication but also illustrate how communities negotiate between modernity and tradition. On one hand, urban areas and social media promote more flexible and efficient orthographic patterns, such as digraphs, to facilitate rapid, technology-based communication. On the other hand, oral traditions and rural regions preserve more traditional patterns, such as single graphemes, which are closely tied to verbal practices and local cultural values (Crystal 2018; Finnegan 2012).

Previous studies indicate that modernization often drives shifts in communication patterns, particularly in the context of urbanization and the penetration of digital media (Labov 2006; Herring et al. 2013). However, in communities rooted in oral traditions, suprasegmental elements such as intonation, rhythm, and stress remain dominant factors in maintaining simple yet meaningful communication patterns (Duranti 1997; Ladefoged and Johnson 2014).

This study aims to uncover how differing social contexts influence the orthographic preferences of Gorontalo communities. The following data visualizations provide a detailed depiction of the distribution of orthographic preferences across various social contexts, including social media, urban and rural areas, and oral traditions.

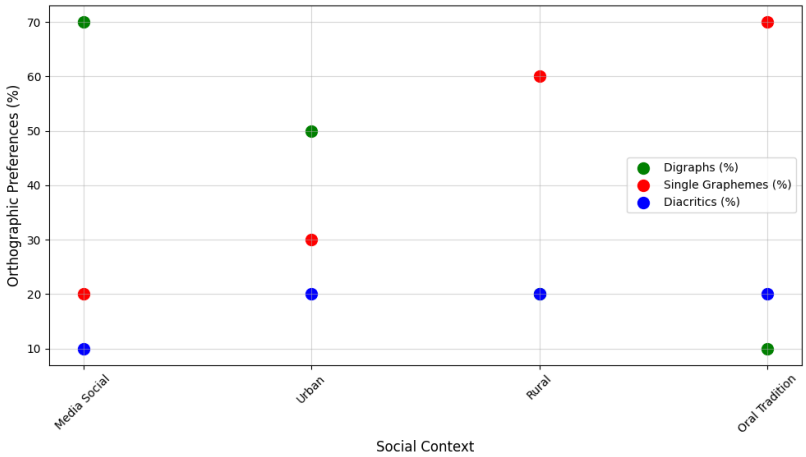

Figure 5: Scatter Plot: Relationship Between Social Context and Orthographic Preferences

The distribution of orthographic preferences, as depicted in Figure 5, reveals a clear relationship between social context and the written communication patterns of Gorontalo communities. Within oral traditions, single graphemes dominate with a proportion of 70%, reflecting the importance of suprasegmental elements in preserving message integrity and meaning, particularly in religious texts, folklore, and traditional rituals (Finnegan 2012; Yule

2022 [Edited to match reference list. Please confirm.]). Writing in this context functions as a complement to verbal communication rather than as a replacement or primary medium. Digraphs account for only 10% due to their limited relevance in culturally rooted communication, while diacritics (20%) play a significant role in emphasizing meaning in formal or religious texts.

In rural areas, which remain heavily reliant on oral traditions, a similar pattern is observed, with single graphemes still dominant at 60%. Suprasegmental elements such as intonation and stress continue to influence societal perceptions of writing as a tool that complements verbal communication. Folklore and religious texts, often employing rich verbal communication, make single graphemes more relevant than other patterns. Conversely, digraphs (20%) and diacritics (20%) play more limited roles as they are less aligned with the needs of conservative rural communities (Ong and Hartley 2013 [Edited to match reference list. Please confirm.]; Crystal 2018).

In urban areas, modernization begins to shape more complex and balanced communication patterns. Digraphs dominate at 50%, reflecting the need for efficiency in written communication, particularly in digital technology contexts (Herring et al. 2013; Fishman 2001). However, single graphemes (30%) and diacritics (20%) remain relevant, particularly in formal domains such as education and official documents. Urbanization introduces a pluralistic interaction between tradition and modernity, where traditional elements are preserved even as the influence of technology grows (Labov 2006).

In the context of social media, digraphs have the highest usage proportion at 70%, consistent with the platform's emphasis on efficiency and speed in communication. Single graphemes are used at 20%, while diacritics account for 10%, reflecting a shift in orthographic preferences entirely focused on the practical needs of technology-based communication. Social media, as an informal communication space, demonstrates that the suprasegmental elements dominant in oral traditions hold little relevance in digital contexts (Duranti 1997; Crystal 2018).

These findings confirm significant differences in orthographic preferences based on the social contexts of Gorontalo. Oral traditions and rural areas maintain single graphemes as the dominant pattern, supported by the strong role of suprasegmental elements in sustaining local cultural continuity. Conversely, urban areas and social media show a preference for digraphs, reflecting the influence of modernization and technology in shaping more flexible and efficient communication patterns.

This study supports the view that tradition and modernity can coexist when a balance is maintained between preserving cultural identity and adapting to social change (Fishman 2001; Yule 2022 [Edited to match reference list. Please confirm.]). Although modernity continues to progress, these findings demonstrate that oral traditions remain a vital foundation for Gorontalo communities in navigating complex social dynamics.

Orthographic choices not only reflect practical needs but also serve as symbols of cultural adaptation, preserving traditional roots amidst the tides of technological and global changes.

The Relationship Between Education and Orthographic Preferences

The orthographic preferences of Gorontalo communities are closely tied to education levels, reflecting not only practical needs in acquiring written language but also the sociocultural dynamics that shape communication patterns. Orthographic forms such as digraphs, single graphemes, and diacritics are utilized differently across educational stages, illustrating a shift between the need for efficiency, local traditions, and formal precision. Education serves not only as a means of language acquisition but also as a medium that bridges local traditions and modernization, as evidenced by the evolving orthographic preferences across different educational levels (Crystal 2018; Yule 2022 [Edited to match reference list. Please confirm.]).

At early educational stages, such as primary school, writing practices focus more on simple comprehension for practical communication. In contrast, at higher levels of education, the need for more formal and complex orthographic forms begins to emerge. This pattern demonstrates that education not only imparts technical writing skills but also shapes how students understand culture and tradition through written language (Finnegan 2012; Ong and Hartley 2013 [Edited to match reference list. Please confirm.]). To visually capture these dynamics, the following scatter plot illustrates the distribution of orthographic preferences across educational levels in Gorontalo.

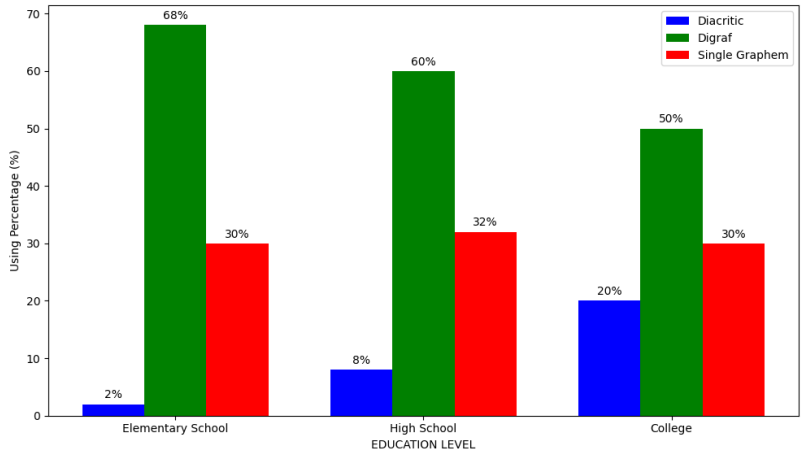

Figure 6: The Comparison Among Education Level and Orthographic Preferences in Gorontalo

The data visualization in Figure 6 reveals the distribution of orthographic preferences, illustrating the relationship between educational levels and the use of digraphs, single graphemes, and diacritics. At the primary school level, digraphs dominate with 68%, while single graphemes account for 30%, and diacritics only 2%. The dominance of digraphs reflects

an early education approach emphasizing simplicity and efficiency in the learning process. Digraphs are more accessible to primary school students due to their straightforward nature, supporting foundational literacy skills in reading and writing. Meanwhile, the minimal use of diacritics indicates that linguistic formality is not a primary focus at this stage (Crystal 2018; Ladefoged and Johnson 2014).

At the secondary school level, while digraphs remain dominant at 60%, there is an increase in the use of single graphemes to 32% and diacritics to 8%. This pattern suggests that secondary education begins to introduce students to more complex and formal orthographic usage. The rising use of single graphemes may reflect the influence of local traditions, as this pattern is often associated with simplicity and cultural proximity, particularly in religious texts and traditional literature (Finnegan 2012; Ong and Hartley 2013 [Edited to match reference list. Please confirm.]). Conversely, the increased use of diacritics at this level indicates growing exposure to linguistic precision, especially in academic contexts or documents requiring formal expression.

At the higher education level, there is a significant shift in orthographic preferences. Digraphs decline to 50%, while single graphemes remain stable at 30%, and diacritics rise to 20%. This shift suggests that higher education emphasizes precision and formality in written communication. Diacritics become more relevant at this stage, particularly in academic or professional contexts where accuracy and detail are paramount. Meanwhile, digraphs, though still dominant, begin to decline as they do not always align with the demands of more formal communication. The stability of single grapheme usage across educational levels reflects the enduring influence of tradition, even as modernization continues to exert its impact (Labov 2006; Duranti 1997).

Orthographic preferences in Gorontalo reflect a complex interplay between educational levels, local traditions, and modernization. At the primary education level, the dominance of digraphs represents the need to simplify early learning, while at secondary and higher education levels, the demand for formality and precision increases, as evidenced by the growing use of diacritics. The consistent use of single graphemes across all educational stages underscores the importance of tradition in shaping the cultural identity of Gorontalo communities.

These findings support the view that education plays a vital role as a bridge between tradition and modernity. Education not only shapes students' technical writing abilities but also influences their perceptions of tradition and formality in written communication. In the context of Gorontalo society, education functions not only as a tool for modernization but also as a medium for preserving local cultural values, ensuring that shifts in communication patterns do not erase key elements of the community's identity (Crystal 2018; Yule 2022 [Edited to match reference list. Please confirm.]; Finnegan 2012; Herring et al. 2013).

Technological Implications for Orthographic Choices

The adoption of technology in Gorontalo communities demonstrates significant variations based on geographical location and social context. These patterns reflect the dynamics between modernity and tradition, where modern technologies such as social media and digital devices are more widely accepted in urban areas, while simpler technologies remain relevant in rural regions. These variations are not only influenced by generational preferences but are also shaped by technology accessibility, social needs, and levels of urbanization (Crystal 2018; Fishman 2001).

Key orthographic tools, such as keyboards, keypads, and touchscreens on digital devices, play a crucial role in shaping orthographic practices in Gorontalo. In the context of digital technology, these features influence the efficiency and ease of using various orthographic methods. This suggests that technological infrastructure is a critical factor in shaping how communities adapt to specific orthographic systems.

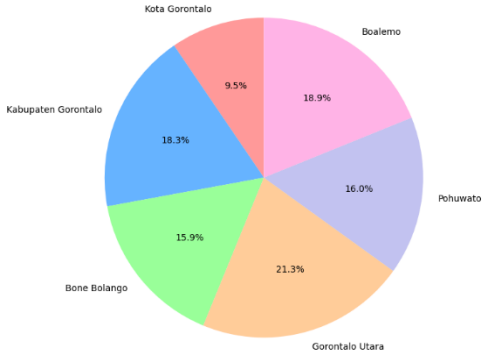

Figure 7: Proportion of Respondents Who Mentioned Technology as a Barrier

The pie chart in Figure 7 illustrates variations in perceptions of technology across six regions in Gorontalo. Rural areas, such as North Gorontalo (21.3%) and Boalemo (18.9%), have the highest percentage of respondents perceiving technology as a barrier. This indicates that limited technological infrastructure, low digital literacy, and inadequate training in using digital devices are significant challenges in these regions (Ong and Hartley 2013 [Edited to match reference list. Please confirm.]; Finnegan 2012). These barriers make it more difficult for rural communities to adopt modern technologies, resulting in a continued preference for simpler orthographic methods, such as single graphemes.

In contrast, Gorontalo City has the lowest percentage of respondents (9.5%) viewing technology as a hindrance. Higher rates of technology adaptation in urban areas are supported by better access to digital devices, higher levels of education, and greater exposure to social media. This pattern aligns with the findings of Herring et al. (2013), which demonstrate that adequate technological infrastructure fosters efficiency and flexibility in digital communication.

The variation in perceptions of technology across Gorontalo reflects the strong relationship between technological accessibility, infrastructure conditions, and sociocultural dynamics. In rural areas, technological barriers are more pronounced, sustaining traditional orthographic methods. Conversely, in urban areas like Gorontalo City, higher technological adaptation enables the use of more efficient methods, such as digraphs, in digital communication.

This analysis underscores the importance of improving technological access and digital literacy in rural areas to bridge the technological divide between regions. Moreover, these findings support the perspectives of Crystal (2018) and Pauwels (2016), who argue that technological modernization does not necessarily replace tradition but instead creates adaptive patterns influenced by local sociocultural contexts.

These results are consistent with global patterns, where urban regions tend to adopt technology more quickly due to advanced infrastructure and better access to education (Labov 2006). Conversely, rural areas, such as North Gorontalo and Boalemo, are often slower to integrate technology due to structural barriers, including high costs and limited resources (Duranti 1997; Fishman 2001).

The accompanying scatter plot visualizes the relationship between technological exposure and orthographic preferences, mapping the interaction of location and generational indicators. This scatter plot provides a quantitative perspective on how specific combinations of variables influence orthographic adaptation across different contexts.

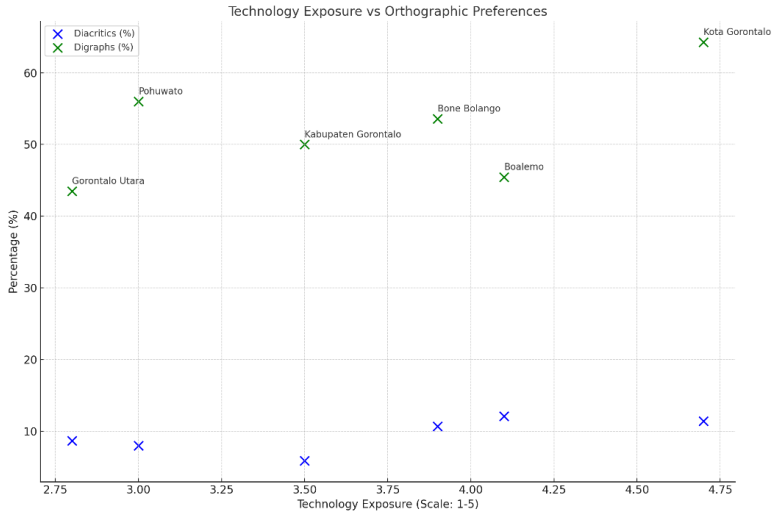

Figure 8: Relationship Between Technological Exposure and Orthographic Preferences[COMP: Replace hyphen with N dash in "1-5"]

The scatter plot in Figure 8 provides a detailed perspective on the relevance of technology across different regions. The data reveal that areas with high technological exposure, such as Gorontalo City, show a strong preference for modern technology, as indicated by the dominance of digraphs (60%) as the primary orthographic pattern. This reflects the urban youth's demand for efficiency in technology-based communication (Herring et al. 2013). In contrast, regions such as North Gorontalo and Pohuwato, with lower technological exposure, are more inclined to maintain single graphemes as their main orthographic pattern, highlighting an attachment to tradition and limited access to technology.

The scatter plot also illustrates the relationship between generational relevance and social context. The range of relevance values (*Y*-axis) indicates that lower values (0–1) are predominantly found in rural areas, where technology is perceived as less relevant for younger generations. For instance, simpler technologies referred to as "rural technologies" dominate in regions like Pohuwato and North Gorontalo. Conversely, higher relevance values (3–5) are observed in urban areas such as Gorontalo City and Gorontalo Regency, where indicators like "social media" and "practicality" align more closely with the needs of the younger generation (Crystal 2018; Duranti 1997).

Additionally, the scatter plot highlights transitional regions such as Bone Bolango. This area demonstrates high relevance to mobile technologies ($Y = 3–4$), reflecting an adaptation phase where traditional elements persist, but modern technology adoption is increasing. Boalemo, on the other hand, shows the highest relevance ($Y = 5$) for the "practicality" indicator, indicating a strong demand for efficiency among the younger generation (Ong and Hartley 2013 [Edited to match reference list. Please confirm.]).

These visualizations complement one another in explaining the relationship between technological exposure, orthographic preferences, and perceptions of technological barriers in Gorontalo. The pie chart reveals that regions with high perceptions of technological barriers tend to have low technological exposure and maintain traditional patterns, as seen in North Gorontalo and Boalemo. In contrast, the scatter plot indicates that regions with high technological exposure, such as Gorontalo City, favor modern patterns like digraphs.

This data confirm that technological exposure acts as a catalyst in shaping orthographic preferences, but the success of technology adoption heavily depends on social factors such as infrastructure, digital literacy, and local cultural values (Herring et al. 2013; Fishman 2001). While modernization drives technological adoption in urban areas, tradition continues to play a significant role in rural regions, particularly in sustaining patterns such as single graphemes.

These findings highlight how technology adoption in Gorontalo is influenced by the interplay of technological exposure, generational relevance, and social context. Urban areas like Gorontalo City exhibit more progressive technology adoption, with a strong preference for modern orthographic patterns like digraphs. Conversely, rural areas like North Gorontalo

and Boalemo tend to preserve traditional patterns, reflecting cultural resistance to rapid technological modernization.

By combining quantitative and qualitative perspectives, this analysis provides deep insights into the technological divide between urban and rural areas. This approach not only maps the data distribution but also uncovers the social contexts underpinning these patterns. These findings offer a foundation for policy development aimed at reducing technological disparities, considering local needs and the potential for transitioning to modern technologies across Gorontalo's regions.

Discussion

Sociocultural Dimensions: Orthography as a Marker of Identity

The orthographic choices of Gorontalo communities reveal a close relationship between cultural practices and identity formation. Rural areas like North Gorontalo exhibit a dominance of single graphemes, reflecting oral traditions that prioritize suprasegmental elements such as intonation and stress over complex visual representations in writing. This underscores the role of orthography as a tool for preserving local cultural heritage, where writing serves as a supplementary rather than primary medium for communication (Finnegan 2012; Ong and Hartley 2013 [Edited to match reference list. Please confirm.]).

The use of single graphemes aligns with findings by Chebanne (2016) on Khoisan communities in Botswana, where simplified orthography helps sustain cultural identity amid marginalization. In Gorontalo, this choice similarly reflects resistance to modern pressures, as highlighted by Villa and Vosters (2015), who argue that orthography often becomes an ideological battleground for preserving local values against global dominance.

In contrast, urban areas like Gorontalo City exhibit a preference for digraphs, symbolizing efficiency and adaptation to modernity. As noted in Hillewaert's (2015) study on social media, the use of digraphs reflects not only communicative functionality but also social identity, showcasing connectivity with digital technology. Globally, this shift illustrates urban communities' efforts to negotiate a modern identity while maintaining respect for cultural roots.

Technology and Orthographic Transformation

Technology serves as a major catalyst for changing orthographic patterns in urban Gorontalo. The preference for digraphs in digital environments reflects how tools like keyboards and touchscreens promoted efficient communication. Herring et al. (2013) highlights that digitalization often influences societies to prioritize methods of communication that are faster and easier to comprehend.

However, technology also reveals adoption disparities in rural areas. Higher perceptions of technological barriers in North Gorontalo and Boalemo reflect uneven access to technology. This factor reinforces the dominance of simple single graphemes, which better align with technological limitations in these regions (Mlambo and Matfunjwa 2024 [Edited to match reference list. Please confirm.]). Here, technology becomes not only a tool for transformation but also a symbol of social and geographical inequalities.

Nevertheless, the potential of technology to support cultural preservation cannot be overlooked. Weber et al.'s (2023) study on Blackfoot Words demonstrates how digital platforms can archive local languages and support community literacy. A similar approach could be applied in Gorontalo, leveraging technology to document oral traditions and strengthen single grapheme practices as part of local cultural preservation.

Education as a Bridge Between Tradition and Modernity

Education serves as a crucial arena for bridging the gap between tradition and modernity. The use of diacritics in formal institutions reflects efforts to maintain formality in written communication. However, data indicate that diacritics are used less frequently than digraphs or single graphemes, suggesting their limited functionality outside educational contexts.

This case parallels Dubost et al.'s (2019) findings on the Hmong community in Laos, where successful orthographic reforms involved local community engagement to create culturally relevant and functional systems. In Gorontalo, integrating local elements into the educational curriculum could enhance the relevance of formal orthography, such as diacritics, while addressing the needs of rural communities that prioritize single graphemes.

Additionally, research by Majorano et al. (2021) highlights that orthographic consistency plays a vital role in supporting literacy. Education can be a strategic tool for improving literacy in Gorontalo through community-based approaches that merge local traditions with modern technology. For example, educational programs that promote digraph use in urban areas and single graphemes in rural areas could bridge these gaps effectively.

Global Reflection: Social, Technological, and Policy Implications

The findings from Gorontalo illustrate how orthography functions as both a tool for cultural preservation and a symbol of modernity, aligning with global trends. Chebanne's (2016) study on African communities shows that simplified orthography can serve as a means of preserving tradition amid marginalization, while Hillewaert (2015) highlights the role of modern orthography in constructing identity within digital spaces.

In the context of Gorontalo, technology has the potential to simultaneously support cultural preservation and enhance communication efficiency. As suggested by Mlambo and Matfunjwa (2024) [Edited to match reference list. Please confirm.] and Weber et al. (2023), digitalization can be an inclusive tool for improving literacy in rural areas without

compromising traditional values. However, literacy policies must be designed to address technological disparities and ensure that local needs remain a priority.

Community involvement in orthographic development also emerges as a key factor for success, as demonstrated by Dondelewski and Czopek (2022). Similar initiatives in Gorontalo could include community-based programs to support the use of single graphemes and digraphs, reflecting local needs while reinforcing cultural identity.

Conclusion

The orthographic choices in Gorontalo reflect the dynamic interplay between cultural traditions and modernity, influenced significantly by sociocultural, technological, and educational factors. Rural areas tend to retain single graphemes as a reflection of oral traditions that emphasize suprasegmental elements and collective cultural identity. Conversely, urban areas demonstrate a dominance of digraphs, highlighting adaptation to digital technology and the demand for communication efficiency.

Education plays a pivotal role in bridging this divide, with significant potential to integrate traditional elements and modern needs through community-based curricula. Technology, while a driver of orthographic transformation in urban areas, continues to face significant challenges in rural regions due to infrastructure limitations and low digital literacy.

Globally, these findings align with similar phenomena in other regions, such as Africa and Southeast Asia, where orthography serves as both a tool for cultural preservation and a symbol of modernity. The results contribute to broader discussions on the relationship between orthography, identity, and social change, emphasizing the importance of community-based approaches in literacy development and orthographic policymaking.

Recommendations

Addressing the findings of this study requires strategic interventions that balance tradition, modernity, and local needs. One critical step is the enhancement of digital literacy in rural areas, where limited technological infrastructure and low digital literacy levels persist. Community-based digital literacy programs tailored to local contexts can serve as a bridge, incorporating region-specific orthographic practices to empower rural communities in adapting to modern communication demands. Alongside this, educational curricula should reflect a dual approach: integrating single graphemes as symbols of cultural identity for rural regions, while promoting digraphs in urban areas to align with technological efficiency and global communication trends.

Further, the development of digital tools holds immense potential in supporting both tradition and modernization. Local governments and cultural organizations could collaborate to create applications or platforms that document oral traditions and reinforce

single grapheme practices. Such tools not only preserve cultural identity but also foster literacy and modern communication skills. Community engagement is essential in these efforts; by involving local stakeholders in the design and standardization of orthographic systems, policies and tools can remain culturally relevant and practical. Lastly, continued research into the intersection of technology, literacy, and cultural preservation is crucial. Future studies should evaluate the long-term effects of technology-driven literacy policies, especially in rural areas, and investigate the sustainability of integrating traditional orthographic practices into modern technological contexts.

Limitations

Despite its contributions, this study has several limitations that should be acknowledged. The research's limited sample size and geographic coverage may constrain the generalizability of its findings to all regions of Gorontalo. Expanding the sample to include a broader demographic would provide more representative insights into orthographic preferences and practices. Furthermore, the study's focus on Gorontalo limits the applicability of its conclusions to other regions in Indonesia, underscoring the need for comparative studies across diverse linguistic and cultural contexts.

Another limitation is the absence of longitudinal data. This research provides a snapshot of orthographic preferences but does not examine how these preferences evolve over time in response to technological, educational, or sociocultural changes. Longitudinal studies could offer valuable insights into the sustainability of shifts in orthographic practices. Additionally, the lack of experimental approaches restricts the study's ability to measure the direct impact of interventions such as digital literacy training or community-based orthographic policies. Incorporating experimental designs in future research would help assess the effectiveness of specific strategies in transforming orthographic preferences.

Finally, while this study highlights the influence of technology on orthographic practices, it does not explore the role of specific technological tools, such as mobile applications or educational software, in shaping these practices. Addressing this gap in future research could provide a more nuanced understanding of the interplay between technology and orthography in Gorontalo and other similar contexts.

Acknowledgment

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Informed Consent

The authors have obtained informed consent from all participants.

Conflict of Interest

The authors declare that there is no conflict of interest.

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Original Research

Orthographic Representation of Long Vowels in Gorontalo: A Sociolinguistic Perspective on Tradition and Technology

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Abstract: This study examines the orthographic representation of long vowels in Gorontalo, focusing on the sociolinguistic interplay between tradition and technology. Data were collected from 213 respondents across six administrative regions using a mixed-methods approach to explore preferences for single graphemes, digraphs, and diacritics in varied sociocultural and technological contexts. The findings reveal distinct patterns: rural communities primarily retain single graphemes, reflecting oral traditions that emphasize suprasegmental features like rhythm and intonation. In contrast, urban areas adopt digraphs for their practicality in digital communication, while diacritics are predominantly confined to formal educational settings with minimal use in everyday contexts. Technology significantly shapes orthographic preferences, with digital tools promoting modern practices in urban areas, while technological limitations in rural regions sustain traditional systems. Education emerges as a pivotal factor, offering opportunities to reconcile local traditions with contemporary demands through community-based curricula. This study contributes to global discourses on orthographic representation, sociolinguistic identity, and the integration of tradition with technological advancements. The Gorontalo case illustrates how orthographic practices act as cultural artifacts, mediating identity and communication amid rapid social and technological change.

Keywords: *Orthographic Representation, Long Vowels, Gorontalo, Sociolinguistics, Digital Communication*
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Introduction

Orthographic systems play a central role in supporting literacy, written communication, and cultural preservation, particularly in the context of minority languages that are vulnerable to the pressures of modernization. As the visual representation of spoken language, orthography enables the relationship between graphemes and phonemes to be translated into consistent and meaningful written forms (Coulmas 2003; Crystal 2018). However, for minority languages such as Gorontalo, the challenge of developing a stable and relevant orthographic system remains a pressing issue. In particular, inconsistencies in orthographic representation,

especially of long vowels, pose significant barriers to literacy and intergenerational comprehension.

Long vowels serve an essential phonemic function in Gorontalo, where their presence directly affects word meaning. For instance, the words *tu'o* (vomit) and *tuu'o* (hidden) illustrate how variations in vowel length produce substantial semantic differences. Nevertheless, variability in writing practices—ranging from the use of diacritics, digraphs, or omission of vowel-length markers—frequently generates ambiguity, hindering literacy, and reducing clarity in written communication (Ladefoged and Johnson 2014).

This issue is not unique to Gorontalo. Similar challenges are observed in other minority languages worldwide. For example, in Botswana, orthographic inconsistencies in Khoisan languages have impeded literacy development and weakened cultural recognition (Chebanne 2016). In Laos, community-based reforms of the Hmong language's orthography successfully established a culturally relevant and phonologically accurate writing system, significantly improving literacy (Dubost et al. 2019). Likewise, in Vietnam, orthographic reforms in the Cham language have demonstrated how accurate phonological representation can strengthen literacy while revitalizing cultural identity.

In Indonesia, orthographic inconsistencies extend beyond Gorontalo to other regional languages, including Sundanese, Bugis, and Minangkabau. Challenges in representing phonological elements, such as vowel length, create obstacles to literacy, particularly among younger generations who are more accustomed to the standardized orthography of Indonesian. For Gorontalo, this issue is exacerbated by the dominance of Indonesian as the national language, which has increasingly replaced many functions of Gorontalo in daily communication.

Sociocultural dynamics also play a crucial role in shaping orthographic preferences among Gorontalo communities. Research indicates that orthographic conflicts often reflect underlying power hierarchies and language ideologies within societies (Villa and Vosters 2015). The dominance of Indonesian has not only accelerated the marginalization of Gorontalo but also created a disconnect between traditional practices and modern needs. Conversely, community-based approaches have proven effective in addressing such challenges. For example, Dondelewski and Czopek (2022) highlighted how local community involvement in orthographic reforms can strengthen a sense of ownership over the language and enhance consistency in writing systems.

Although substantial research has explored orthography in minority languages, most studies primarily focus on phonological and morphological descriptions, neglecting in-depth examination of sociocultural and technological dimensions. Community-based approaches, successfully implemented in orthographic reforms for languages such as Maori in New Zealand and Khoisan in South Africa, have yet to be widely applied to Gorontalo (Chebanne 2016; Smith ~~and Walsh 2018~~2022 [Please add to reference list.]). Additionally, while advancements in digital tools such as local keyboards and artificial intelligence (AI)–powered

applications show significant potential to enhance orthographic consistency, their utilization remains minimal in the context of Gorontalo.

The Gorontalo language faces substantial challenges due to orthographic inconsistencies, particularly in the representation of long vowels. The ambiguity arising from varying writing practices poses significant barriers to literacy and written communication. Moreover, the absence of clear orthographic guidelines, limited technological support, and the dominance of Indonesian exacerbate these issues. A holistic approach is therefore required to bridge the gaps between linguistic needs, sociocultural dynamics, and technological solutions for Gorontalo's writing system.

This study aims to examine the variations in the practice of writing long vowels across different regions of Gorontalo, with a particular focus on the distribution of graphemes, diacritics, and digraphs. Additionally, it seeks to analyze the influence of sociocultural factors, such as local traditions and generational differences, on the orthographic preferences among Gorontalo communities. Another key objective is to evaluate the impact of digital tools, including localized keyboards and AI-based applications, in enhancing orthographic consistency and helping to preserve the Gorontalo language.

The study addresses three primary aspects. First, from a linguistic perspective, it examines variations in the practice of writing long vowels across Gorontalo. Second, it explores the sociocultural dimensions of orthographic preferences, considering traditional values, generational differences, and social contexts. Finally, from a technological standpoint, the study evaluates the potential of digital tools to support orthographic consistency and promote language preservation.

Methodology

Research Approach

This study employs a descriptive–exploratory approach with mixed methods, integrating quantitative and qualitative data to provide a comprehensive understanding of the distribution of long vowel orthography in Gorontalo, as well as the sociocultural influences and the impact of technology and education on orthographic consistency. This approach was chosen, as it offers deeper insights than relying on a single method alone (Creswell and Creswell 2017 [Edited to match reference list. ~~Please confirm~~it has matched the reference list.]; Tashakkori and Teddlie 2010). The descriptive–exploratory design was used to examine existing orthographic patterns, while the mixed-methods approach provided flexibility in combining statistical and thematic analyses (Yin 2018; Flick 2018).

Research Location and Participants

The research was conducted across six administrative regions in Gorontalo Province: Gorontalo City, Gorontalo Regency, Bone Bolango Regency, Boalemo Regency, Pohuwato Regency, and North Gorontalo Regency. These regions were selected to capture the social, cultural, and geographical diversity relevant to the distribution of orthographic practices. The participants comprised 213 individuals selected through purposive sampling, a method suitable for qualitative research as it allows the selection of participants with in-depth knowledge of the study topic (Lawrence Neuman 2014; Etikan et al. 2016). Participants included students, teachers, indigenous community members, and digital technology users to capture the dynamics of orthography across domains such as formal education, digital communication, and local cultural traditions (Israel and Hay 2006).

Data Collection Procedures

Data were collected through surveys, semi-structured interviews, and focus group discussions (FGDs). Triangulation of data was employed to enhance the validity and reliability of the research findings by combining multiple methods and data sources (Denzin 2017). [Edited to match reference list. it has matched the reference list~~Please confirm~~.]

1. Survey: The survey utilized structured questionnaires to document the distribution of long vowel orthographic practices, including diacritics, digraphs, and single graphemes. The survey provided quantitative data to capture general preferences across the six research locations (Bryman 2016; Field 2024).
2. Semi-Structured Interviews: Semi-structured interviews were designed to delve deeper into the sociocultural factors influencing orthographic preferences in Gorontalo. They allowed participants to elaborate on their preferences and the role of technology and education in shaping their orthographic practices (Guest et al. 2011).
3. Focus Group Discussions: Focus Group Discussions (FGDs) were conducted to discuss the opportunities and challenges in implementing a dual-system orthographic model. These discussions involved representatives from local communities, teachers, and language practitioners to identify needs and expectations for orthographic reform (Chebanne 2016; Smith ~~and Walsh 2018~~2022).

Research Instruments

This study employed three types of instruments:

1. Questionnaires: Used to measure the distribution of orthographic usage and participants' perceptions of orthographic consistency within their respective regions (Bryman 2016; Creswell and Poth 2016).

2. Interview Guides: Developed to explore social and technological dimensions of orthographic preferences (Lawrence Neuman 2014; Braun and Clarke 2006).
3. FGD Guidelines: Designed to analyze collective perspectives on the development and application of a dual-system orthographic model (Israel and Hay 2006; Creswell and Poth 2016).

Data Processing and Analysis Procedures

The data collected in this study were analyzed using both quantitative and qualitative approaches to ensure a comprehensive understanding of orthographic preferences across different research locations. The following methods were employed: [please introduce this list]

1. Quantitative Analysis: Data from the surveys were analyzed using descriptive statistics to identify the distribution of diacritics, digraphs, and single graphemes across the six research locations. This analysis provided a detailed understanding of orthographic preferences in various social contexts (Field 2024; Tashakkori and Teddlie 2010).
2. Qualitative Analysis: Data from interviews and FGDs were analyzed thematically to identify patterns, themes, and relationships relevant to the orthographic preferences of Gorontalo communities. This method is effective for exploring the sociocultural dimensions within the research context (Braun and Clarke 2006; Guest et al. 2011).

Ethical Considerations

This study adhered to research ethics guidelines by ensuring that all participants were fully informed about the research objectives, methods, and their rights as participants. Participation was voluntary, with written informed consent obtained from all participants. Data confidentiality was strictly maintained throughout the research process and subsequent publication (Israel and Hay 2006; Babbie 2020).

Data Reliability and Validity

To ensure data reliability and validity, a pilot test of the questionnaire was conducted with ten respondents before the main survey. Additionally, methodological triangulation was employed to compare findings from the survey, interviews, and FGDs, enhancing the credibility and trustworthiness of the research results (Denzin 2017 [Edited to match reference list. it has matched the reference list~~Please confirm~~.]; Lincoln and Guba 1985).

Results

Distribution of Long Vowel Orthographic Practices

With modernization, social media and digital communication have transformed how communities choose orthographic patterns, particularly in urban areas where efficiency emerges as a dominant factor (Baron 2010; Tagg and Seargeant 2021 ~~[Please add to reference list.]~~). However, tradition continues to play a significant role in rural areas, reflecting how communication patterns are preserved as a form of cultural identity (Finnegan 2012; Pauwels 2016).

The orthographic choices of Gorontalo communities highlight the interplay between cultural traditions, social dynamics, and technological influences. In this context, urban areas such as Gorontalo City exhibit progressive adoption of technology, with digraphs dominating orthographic practices. Conversely, rural areas like North Gorontalo and Boalemo tend to retain single graphemes, aligning with oral traditions rich in suprasegmental elements such as intonation and rhythm (Harrison and Anderson 2008; Leith 2016 [Edited to match reference list. ~~it has matched the reference list~~~~Please confirm.~~]).

These findings are visualized through grouped bar charts and heatmaps, offering comprehensive insights into the distribution of orthographic practices, driving factors, and respondent characteristics across the six regions of Gorontalo (see Figure 1).

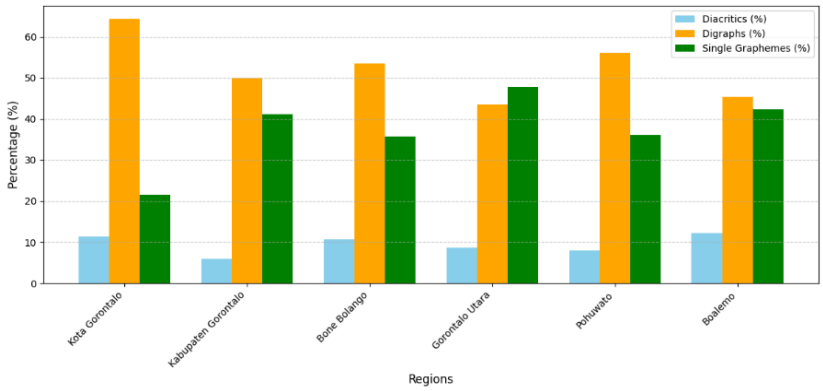

Figure 1: Distribution of Orthographic Practices Across Regions

The grouped bar chart illustrates the distribution of diacritics, digraphs, and single graphemes across six regions in Gorontalo. Gorontalo City demonstrates a dominance of digraphs (64.29%), reflecting the urban community's emphasis on efficiency in digital communication. Digraphs are preferred for their ability to expedite communication without compromising meaning, aligning with the findings of Herring et al. (2013), who noted that digital language prioritizes speed and practicality.

In contrast, rural regions like North Gorontalo exhibit a dominance of single graphemes (47.83%), closely tied to oral traditions. As explained by Ong and Hartley (2013) [Edited to

match reference list. it has matched the reference list~~Please confirm~~.], oral traditions rely heavily on suprasegmental features such as intonation and stress, with written forms functioning merely as complements to spoken language.

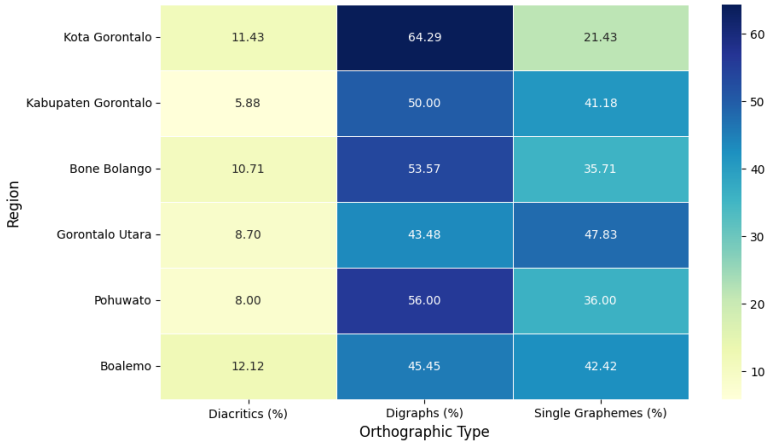

Figure 2: The Heatmap of Orthographic Practice by Region

The heatmap in Figure 2 emphasizes the orthographic variations across different regions. Darker shades in Gorontalo City highlight the dominance of digraphs, while North Gorontalo exhibits a high intensity of single grapheme usage. Regions such as Bone Bolango and Pohuwato display a more balanced distribution between digraphs and single graphemes, reflecting transitional areas that strive to integrate modernity with local traditions. This analysis aligns with Fishman's (2001) theory, which asserts that language patterns reflect the interaction between sociocultural dynamics and technological changes.

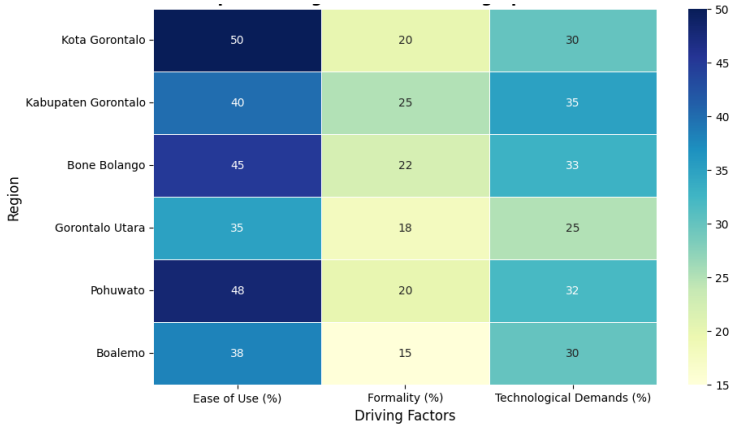

Figure 3: Heatmap of Driving Factors for Orthographic Preferences

The heatmap in Figure 3 illustrates the primary reasons behind orthographic choices across different regions. Gorontalo City stands out with "ease of use" as the dominant factor (50%), aligning with the demand for fast communication in digital spaces (Baron 2010; Tagg and Seargeant 2021). In contrast, the "more formal" factor is more prominent in semi-urban areas such as Gorontalo Regency (25%), reflecting the need to adapt orthographic practices to educational or official documentation contexts. Rural areas like North Gorontalo indicate that the "technological demand" factor has less influence compared to urban regions, consistent with limited access to technology in these areas.

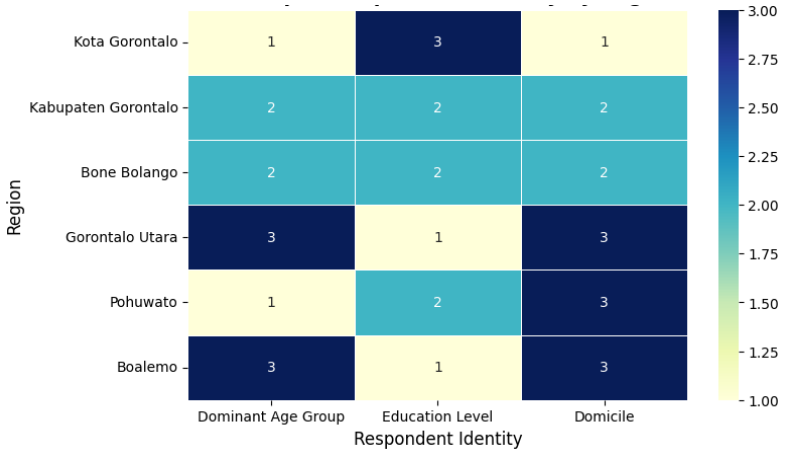

Figure 4: Heatmap of Respondent Identity by Region

The heatmap in Figure 4 provides insights into the social characteristics underlying orthographic preferences. Gorontalo City, dominated by a younger generation with higher education levels and urban residence, tends to favor digraphs as a symbol of modernity. Conversely, rural areas such as Boalemo and North Gorontalo, characterized by older generations with lower education levels and rural residence, prefer single graphemes to preserve traditional patterns. These findings align with Pauwels' (2016) theory, which posits that language and orthographic choices often reflect cultural identity.

The visualization illustrates that Gorontalo's orthographic preferences are shaped by the interaction between tradition, modernization, and social dynamics. Urban areas, such as Gorontalo City, exhibit high adoption of digraphs, driven by efficiency needs and the influence of digital technology. In contrast, rural areas like North Gorontalo maintain single graphemes as part of oral traditions, reflecting a strong cultural identity.

These findings highlight the importance of understanding the social and cultural context when analyzing language patterns. As noted by Crystal (2018) and Harrison and Anderson (2008), modernization does not entirely replace tradition but creates a hybridization of communication patterns. The results have significant implications for educational policies

and cultural preservation, particularly in maintaining a balance between technology and tradition amid dynamic social changes.

The Relationship Between Social Context and Orthographic Preferences

The orthographic preferences of Gorontalo communities reflect the complex sociocultural dynamics deeply embedded in their social context. Orthographic patterns, such as digraphs, single graphemes, and diacritics, not only fulfill practical needs for communication but also illustrate how communities negotiate between modernity and tradition. On one hand, urban areas and social media promote more flexible and efficient orthographic patterns, such as digraphs, to facilitate rapid, technology-based communication. On the other hand, oral traditions and rural regions preserve more traditional patterns, such as single graphemes, which are closely tied to verbal practices and local cultural values (Crystal 2018; Finnegan 2012).

Previous studies indicate that modernization often drives shifts in communication patterns, particularly in the context of urbanization and the penetration of digital media (Labov 2006; Herring et al. 2013). However, in communities rooted in oral traditions, suprasegmental elements such as intonation, rhythm, and stress remain dominant factors in maintaining simple yet meaningful communication patterns (Duranti 1997; Ladefoged and Johnson 2014).

This study aims to uncover how differing social contexts influence the orthographic preferences of Gorontalo communities. The following data visualizations provide a detailed depiction of the distribution of orthographic preferences across various social contexts, including social media, urban and rural areas, and oral traditions.

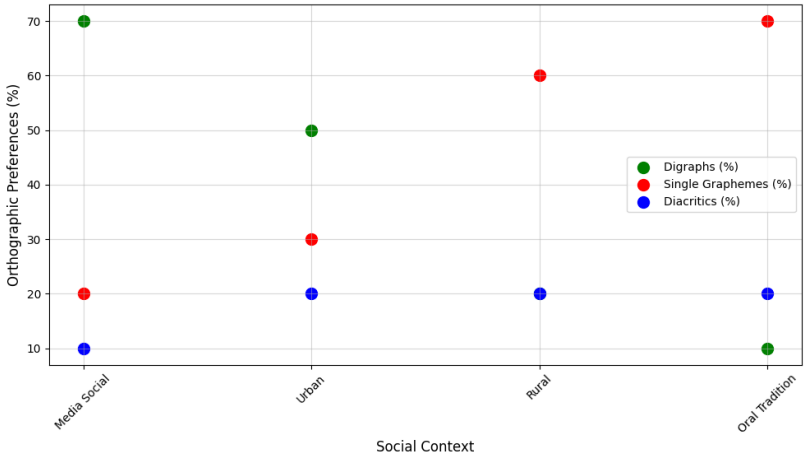

Figure 5: Scatter Plot: Relationship Between Social Context and Orthographic Preferences

The distribution of orthographic preferences, as depicted in Figure 5, reveals a clear relationship between social context and the written communication patterns of Gorontalo communities. Within oral traditions, single graphemes dominate with a proportion of 70%, reflecting the importance of suprasegmental elements in preserving message integrity and meaning, particularly in religious texts, folklore, and traditional rituals (Finnegan 2012; Yule 2022 [Edited to match reference list. it has matched the reference list~~Please confirm~~.]). Writing in this context functions as a complement to verbal communication rather than as a replacement or primary medium. Digraphs account for only 10% due to their limited relevance in culturally rooted communication, while diacritics (20%) play a significant role in emphasizing meaning in formal or religious texts.

In rural areas, which remain heavily reliant on oral traditions, a similar pattern is observed, with single graphemes still dominant at 60%. Suprasegmental elements such as intonation and stress continue to influence societal perceptions of writing as a tool that complements verbal communication. Folklore and religious texts, often employing rich verbal communication, make single graphemes more relevant than other patterns. Conversely, digraphs (20%) and diacritics (20%) play more limited roles as they are less aligned with the needs of conservative rural communities (Ong and Hartley 2013 [Edited to match reference list. it has matched the reference list~~Please confirm~~.]; Crystal 2018).

In urban areas, modernization begins to shape more complex and balanced communication patterns. Digraphs dominate at 50%, reflecting the need for efficiency in written communication, particularly in digital technology contexts (Herring et al. 2013; Fishman 2001). However, single graphemes (30%) and diacritics (20%) remain relevant, particularly in formal domains such as education and official documents. Urbanization introduces a pluralistic interaction between tradition and modernity, where traditional elements are preserved even as the influence of technology grows (Labov 2006).

In the context of social media, digraphs have the highest usage proportion at 70%, consistent with the platform's emphasis on efficiency and speed in communication. Single graphemes are used at 20%, while diacritics account for 10%, reflecting a shift in orthographic preferences entirely focused on the practical needs of technology-based communication. Social media, as an informal communication space, demonstrates that the suprasegmental elements dominant in oral traditions hold little relevance in digital contexts (Duranti 1997; Crystal 2018).

These findings confirm significant differences in orthographic preferences based on the social contexts of Gorontalo. Oral traditions and rural areas maintain single graphemes as the dominant pattern, supported by the strong role of suprasegmental elements in sustaining local cultural continuity. Conversely, urban areas and social media show a preference for digraphs, reflecting the influence of modernization and technology in shaping more flexible and efficient communication patterns.

This study supports the view that tradition and modernity can coexist when a balance is maintained between preserving cultural identity and adapting to social change (Fishman 2001; Yule 2022 [Edited to match reference list. it has matched the reference list~~Please confirm~~.]). Although modernity continues to progress, these findings demonstrate that oral traditions remain a vital foundation for Gorontalo communities in navigating complex social dynamics. Orthographic choices not only reflect practical needs but also serve as symbols of cultural adaptation, preserving traditional roots amidst the tides of technological and global changes.

The Relationship Between Education and Orthographic Preferences

The orthographic preferences of Gorontalo communities are closely tied to education levels, reflecting not only practical needs in acquiring written language but also the sociocultural dynamics that shape communication patterns. Orthographic forms such as digraphs, single graphemes, and diacritics are utilized differently across educational stages, illustrating a shift between the need for efficiency, local traditions, and formal precision. Education serves not only as a means of language acquisition but also as a medium that bridges local traditions and modernization, as evidenced by the evolving orthographic preferences across different educational levels (Crystal 2018; Yule 2022 [Edited to match reference list. it has matched the reference list~~Please confirm~~.]).

At early educational stages, such as primary school, writing practices focus more on simple comprehension for practical communication. In contrast, at higher levels of education, the need for more formal and complex orthographic forms begins to emerge. This pattern demonstrates that education not only imparts technical writing skills but also shapes how students understand culture and tradition through written language (Finnegan 2012; Ong and Hartley 2013 [Edited to match reference list. it has matched the reference list~~Please confirm~~.]). To visually capture these dynamics, the following scatter plot illustrates the distribution of orthographic preferences across educational levels in Gorontalo.

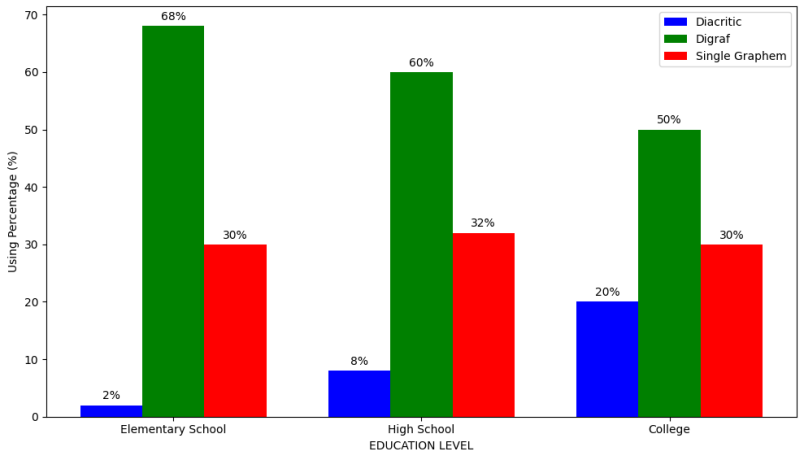

Figure 6: The Comparison Among Education Level and Orthographic Preferences in Gorontalo

The data visualization in Figure 6 reveals the distribution of orthographic preferences, illustrating the relationship between educational levels and the use of digraphs, single graphemes, and diacritics. At the primary school level, digraphs dominate with 68%, while single graphemes account for 30%, and diacritics only 2%. The dominance of digraphs reflects an early education approach emphasizing simplicity and efficiency in the learning process. Digraphs are more accessible to primary school students due to their straightforward nature, supporting foundational literacy skills in reading and writing. Meanwhile, the minimal use of diacritics indicates that linguistic formality is not a primary focus at this stage (Crystal 2018; Ladefoged and Johnson 2014).

At the secondary school level, while digraphs remain dominant at 60%, there is an increase in the use of single graphemes to 32% and diacritics to 8%. This pattern suggests that secondary education begins to introduce students to more complex and formal orthographic usage. The rising use of single graphemes may reflect the influence of local traditions, as this pattern is often associated with simplicity and cultural proximity, particularly in religious texts and traditional literature (Finnegan 2012; Ong and Hartley 2013 [Edited to match reference list. it has matched the reference list~~Please confirm.~~]). Conversely, the increased use of diacritics at this level indicates growing exposure to linguistic precision, especially in academic contexts or documents requiring formal expression.

At the higher education level, there is a significant shift in orthographic preferences. Digraphs decline to 50%, while single graphemes remain stable at 30%, and diacritics rise to 20%. This shift suggests that higher education emphasizes precision and formality in written communication. Diacritics become more relevant at this stage, particularly in academic or professional contexts where accuracy and detail are paramount. Meanwhile, digraphs, though still dominant, begin to decline as they do not always align with the demands of more formal communication. The stability of single grapheme usage across educational levels reflects the

enduring influence of tradition, even as modernization continues to exert its impact (Labov 2006; Duranti 1997).

Orthographic preferences in Gorontalo reflect a complex interplay between educational levels, local traditions, and modernization. At the primary education level, the dominance of digraphs represents the need to simplify early learning, while at secondary and higher education levels, the demand for formality and precision increases, as evidenced by the growing use of diacritics. The consistent use of single graphemes across all educational stages underscores the importance of tradition in shaping the cultural identity of Gorontalo communities.

These findings support the view that education plays a vital role as a bridge between tradition and modernity. Education not only shapes students' technical writing abilities but also influences their perceptions of tradition and formality in written communication. In the context of Gorontalo society, education functions not only as a tool for modernization but also as a medium for preserving local cultural values, ensuring that shifts in communication patterns do not erase key elements of the community's identity (Crystal 2018; Yule 2022 [Edited to match reference list. it has matched the reference list~~Please confirm~~.]; Finnegan 2012; Herring et al. 2013).

Technological Implications for Orthographic Choices

The adoption of technology in Gorontalo communities demonstrates significant variations based on geographical location and social context. These patterns reflect the dynamics between modernity and tradition, where modern technologies such as social media and digital devices are more widely accepted in urban areas, while simpler technologies remain relevant in rural regions. These variations are not only influenced by generational preferences but are also shaped by technology accessibility, social needs, and levels of urbanization (Crystal 2018; Fishman 2001).

Key orthographic tools, such as keyboards, keypads, and touchscreens on digital devices, play a crucial role in shaping orthographic practices in Gorontalo. In the context of digital technology, these features influence the efficiency and ease of using various orthographic methods. This suggests that technological infrastructure is a critical factor in shaping how communities adapt to specific orthographic systems.

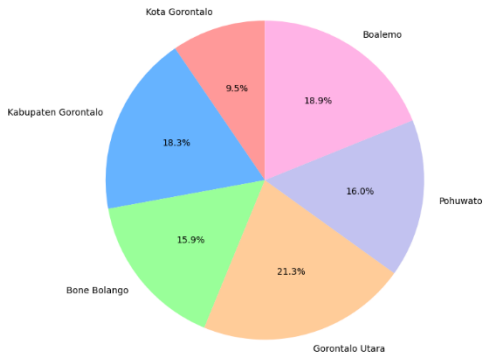

Figure 7: Proportion of Respondents Who Mentioned Technology as a Barrier

The pie chart in Figure 7 illustrates variations in perceptions of technology across six regions in Gorontalo. Rural areas, such as North Gorontalo (21.3%) and Boalemo (18.9%), have the highest percentage of respondents perceiving technology as a barrier. This indicates that limited technological infrastructure, low digital literacy, and inadequate training in using digital devices are significant challenges in these regions (Ong and Hartley 2013 [Edited to match reference list. ~~it has matched the reference list Please confirm.~~]; Finnegan 2012). These barriers make it more difficult for rural communities to adopt modern technologies, resulting in a continued preference for simpler orthographic methods, such as single graphemes.

In contrast, Gorontalo City has the lowest percentage of respondents (9.5%) viewing technology as a hindrance. Higher rates of technology adaptation in urban areas are supported by better access to digital devices, higher levels of education, and greater exposure to social media. This pattern aligns with the findings of Herring et al. (2013), which demonstrate that adequate technological infrastructure fosters efficiency and flexibility in digital communication.

The variation in perceptions of technology across Gorontalo reflects the strong relationship between technological accessibility, infrastructure conditions, and sociocultural dynamics. In rural areas, technological barriers are more pronounced, sustaining traditional orthographic methods. Conversely, in urban areas like Gorontalo City, higher technological adaptation enables the use of more efficient methods, such as digraphs, in digital communication.

This analysis underscores the importance of improving technological access and digital literacy in rural areas to bridge the technological divide between regions. Moreover, these findings support the perspectives of Crystal (2018) and Pauwels (2016), who argue that technological modernization does not necessarily replace tradition but instead creates adaptive patterns influenced by local sociocultural contexts.

These results are consistent with global patterns, where urban regions tend to adopt technology more quickly due to advanced infrastructure and better access to education (Labov 2006). Conversely, rural areas, such as North Gorontalo and Boalemo, are often slower to integrate technology due to structural barriers, including high costs and limited resources (Duranti 1997; Fishman 2001).

The accompanying scatter plot visualizes the relationship between technological exposure and orthographic preferences, mapping the interaction of location and generational indicators. This scatter plot provides a quantitative perspective on how specific combinations of variables influence orthographic adaptation across different contexts.

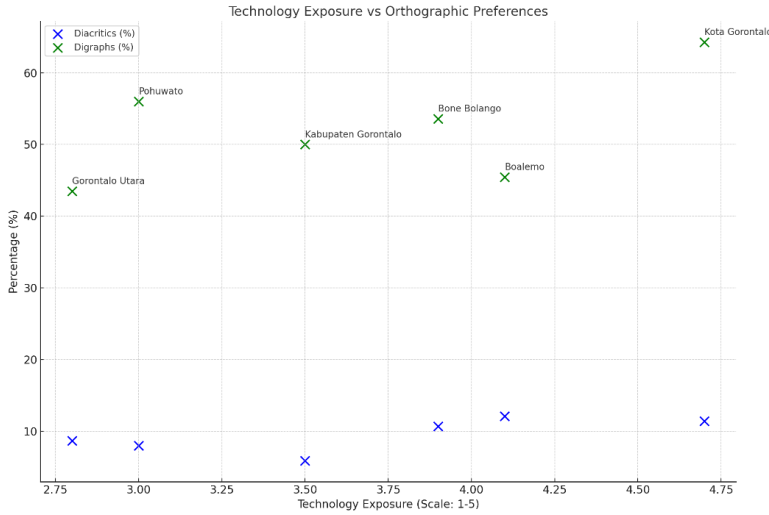

Figure 8: Relationship Between Technological Exposure and Orthographic Preferences[COMP: Replace hyphen with N dash in "1-5"]

The scatter plot in Figure 8 provides a detailed perspective on the relevance of technology across different regions. The data reveal that areas with high technological exposure, such as Gorontalo City, show a strong preference for modern technology, as indicated by the dominance of digraphs (60%) as the primary orthographic pattern. This reflects the urban youth's demand for efficiency in technology-based communication (Herring et al. 2013). In contrast, regions such as North Gorontalo and Pohuwato, with lower technological exposure, are more inclined to maintain single graphemes as their main orthographic pattern, highlighting an attachment to tradition and limited access to technology.

The scatter plot also illustrates the relationship between generational relevance and social context. The range of relevance values (*Y*-axis) indicates that lower values (0–1) are predominantly found in rural areas, where technology is perceived as less relevant for younger generations. For instance, simpler technologies referred to as "rural technologies"

dominate in regions like Pohuwato and North Gorontalo. Conversely, higher relevance values (3–5) are observed in urban areas such as Gorontalo City and Gorontalo Regency, where indicators like "social media" and "practicality" align more closely with the needs of the younger generation (Crystal 2018; Duranti 1997).

Additionally, the scatter plot highlights transitional regions such as Bone Bolango. This area demonstrates high relevance to mobile technologies ($Y = 3–4$), reflecting an adaptation phase where traditional elements persist, but modern technology adoption is increasing. Boalemo, on the other hand, shows the highest relevance ($Y = 5$) for the "practicality" indicator, indicating a strong demand for efficiency among the younger generation (Ong and Hartley 2013 [Edited to match reference list. it has matched the reference list~~Please confirm~~.]).

These visualizations complement one another in explaining the relationship between technological exposure, orthographic preferences, and perceptions of technological barriers in Gorontalo. The pie chart reveals that regions with high perceptions of technological barriers tend to have low technological exposure and maintain traditional patterns, as seen in North Gorontalo and Boalemo. In contrast, the scatter plot indicates that regions with high technological exposure, such as Gorontalo City, favor modern patterns like digraphs.

This data confirm that technological exposure acts as a catalyst in shaping orthographic preferences, but the success of technology adoption heavily depends on social factors such as infrastructure, digital literacy, and local cultural values (Herring et al. 2013; Fishman 2001). While modernization drives technological adoption in urban areas, tradition continues to play a significant role in rural regions, particularly in sustaining patterns such as single graphemes.

These findings highlight how technology adoption in Gorontalo is influenced by the interplay of technological exposure, generational relevance, and social context. Urban areas like Gorontalo City exhibit more progressive technology adoption, with a strong preference for modern orthographic patterns like digraphs. Conversely, rural areas like North Gorontalo and Boalemo tend to preserve traditional patterns, reflecting cultural resistance to rapid technological modernization.

By combining quantitative and qualitative perspectives, this analysis provides deep insights into the technological divide between urban and rural areas. This approach not only maps the data distribution but also uncovers the social contexts underpinning these patterns. These findings offer a foundation for policy development aimed at reducing technological disparities, considering local needs and the potential for transitioning to modern technologies across Gorontalo's regions.

Discussion

Sociocultural Dimensions: Orthography as a Marker of Identity

The orthographic choices of Gorontalo communities reveal a close relationship between cultural practices and identity formation. Rural areas like North Gorontalo exhibit a dominance of single graphemes, reflecting oral traditions that prioritize suprasegmental elements such as intonation and stress over complex visual representations in writing. This underscores the role of orthography as a tool for preserving local cultural heritage, where writing serves as a supplementary rather than primary medium for communication (Finnegan 2012; Ong and Hartley 2013 [Edited to match reference list. Edited to match reference list~~Please confirm~~.]).

The use of single graphemes aligns with findings by Chebanne (2016) on Khoisan communities in Botswana, where simplified orthography helps sustain cultural identity amid marginalization. In Gorontalo, this choice similarly reflects resistance to modern pressures, as highlighted by Villa and Vosters (2015), who argue that orthography often becomes an ideological battleground for preserving local values against global dominance.

In contrast, urban areas like Gorontalo City exhibit a preference for digraphs, symbolizing efficiency and adaptation to modernity. As noted in Hillewaert's (2015) study on social media, the use of digraphs reflects not only communicative functionality but also social identity, showcasing connectivity with digital technology. Globally, this shift illustrates urban communities' efforts to negotiate a modern identity while maintaining respect for cultural roots.

Technology and Orthographic Transformation

Technology serves as a major catalyst for changing orthographic patterns in urban Gorontalo. The preference for digraphs in digital environments reflects how tools like keyboards and touchscreens promoted efficient communication. Herring et al. (2013) highlights that digitalization often influences societies to prioritize methods of communication that are faster and easier to comprehend.

However, technology also reveals adoption disparities in rural areas. Higher perceptions of technological barriers in North Gorontalo and Boalemo reflect uneven access to technology. This factor reinforces the dominance of simple single graphemes, which better align with technological limitations in these regions (Mlambo and Matfunjwa 2024 [Edited to match reference list. Edited to match reference list~~Please confirm~~.]). Here, technology becomes not only a tool for transformation but also a symbol of social and geographical inequalities.

Nevertheless, the potential of technology to support cultural preservation cannot be overlooked. Weber et al.'s (2023) study on Blackfoot Words demonstrates how digital platforms can archive local languages and support community literacy. A similar approach could be applied in Gorontalo, leveraging technology to document oral traditions and strengthen single grapheme practices as part of local cultural preservation.

Education as a Bridge Between Tradition and Modernity

Education serves as a crucial arena for bridging the gap between tradition and modernity. The use of diacritics in formal institutions reflects efforts to maintain formality in written communication. However, data indicate that diacritics are used less frequently than digraphs or single graphemes, suggesting their limited functionality outside educational contexts.

This case parallels Dubost et al.'s (2019) findings on the Hmong community in Laos, where successful orthographic reforms involved local community engagement to create culturally relevant and functional systems. In Gorontalo, integrating local elements into the educational curriculum could enhance the relevance of formal orthography, such as diacritics, while addressing the needs of rural communities that prioritize single graphemes.

Additionally, research by Majorano et al. (2021) highlights that orthographic consistency plays a vital role in supporting literacy. Education can be a strategic tool for improving literacy in Gorontalo through community-based approaches that merge local traditions with modern technology. For example, educational programs that promote digraph use in urban areas and single graphemes in rural areas could bridge these gaps effectively.

Global Reflection: Social, Technological, and Policy Implications

The findings from Gorontalo illustrate how orthography functions as both a tool for cultural preservation and a symbol of modernity, aligning with global trends. Chebanne's (2016) study on African communities shows that simplified orthography can serve as a means of preserving tradition amid marginalization, while Hillewaert (2015) highlights the role of modern orthography in constructing identity within digital spaces.

In the context of Gorontalo, technology has the potential to simultaneously support cultural preservation and enhance communication efficiency. As suggested by Mlambo and Matfunjwa (2024) [Edited to match reference list. Edited to match reference list~~Please confirm~~.] and Weber et al. (2023), digitalization can be an inclusive tool for improving literacy in rural areas without compromising traditional values. However, literacy policies must be designed to address technological disparities and ensure that local needs remain a priority.

Community involvement in orthographic development also emerges as a key factor for success, as demonstrated by Dondelewski and Czopek (2022). Similar initiatives in Gorontalo could include community-based programs to support the use of single graphemes and digraphs, reflecting local needs while reinforcing cultural identity.

Conclusion

The orthographic choices in Gorontalo reflect the dynamic interplay between cultural traditions and modernity, influenced significantly by sociocultural, technological, and

educational factors. Rural areas tend to retain single graphemes as a reflection of oral traditions that emphasize suprasegmental elements and collective cultural identity. Conversely, urban areas demonstrate a dominance of digraphs, highlighting adaptation to digital technology and the demand for communication efficiency.

Education plays a pivotal role in bridging this divide, with significant potential to integrate traditional elements and modern needs through community-based curricula. Technology, while a driver of orthographic transformation in urban areas, continues to face significant challenges in rural regions due to infrastructure limitations and low digital literacy.

Globally, these findings align with similar phenomena in other regions, such as Africa and Southeast Asia, where orthography serves as both a tool for cultural preservation and a symbol of modernity. The results contribute to broader discussions on the relationship between orthography, identity, and social change, emphasizing the importance of community-based approaches in literacy development and orthographic policymaking.

Recommendations

Addressing the findings of this study requires strategic interventions that balance tradition, modernity, and local needs. One critical step is the enhancement of digital literacy in rural areas, where limited technological infrastructure and low digital literacy levels persist. Community-based digital literacy programs tailored to local contexts can serve as a bridge, incorporating region-specific orthographic practices to empower rural communities in adapting to modern communication demands. Alongside this, educational curricula should reflect a dual approach: integrating single graphemes as symbols of cultural identity for rural regions, while promoting digraphs in urban areas to align with technological efficiency and global communication trends.

Further, the development of digital tools holds immense potential in supporting both tradition and modernization. Local governments and cultural organizations could collaborate to create applications or platforms that document oral traditions and reinforce single grapheme practices. Such tools not only preserve cultural identity but also foster literacy and modern communication skills. Community engagement is essential in these efforts; by involving local stakeholders in the design and standardization of orthographic systems, policies and tools can remain culturally relevant and practical. Lastly, continued research into the intersection of technology, literacy, and cultural preservation is crucial. Future studies should evaluate the long-term effects of technology-driven literacy policies, especially in rural areas, and investigate the sustainability of integrating traditional orthographic practices into modern technological contexts.

Limitations

Despite its contributions, this study has several limitations that should be acknowledged. The research's limited sample size and geographic coverage may constrain the generalizability of its findings to all regions of Gorontalo. Expanding the sample to include a broader demographic would provide more representative insights into orthographic preferences and practices. Furthermore, the study's focus on Gorontalo limits the applicability of its conclusions to other regions in Indonesia, underscoring the need for comparative studies across diverse linguistic and cultural contexts.

Another limitation is the absence of longitudinal data. This research provides a snapshot of orthographic preferences but does not examine how these preferences evolve over time in response to technological, educational, or sociocultural changes. Longitudinal studies could offer valuable insights into the sustainability of shifts in orthographic practices. Additionally, the lack of experimental approaches restricts the study's ability to measure the direct impact of interventions such as digital literacy training or community-based orthographic policies. Incorporating experimental designs in future research would help assess the effectiveness of specific strategies in transforming orthographic preferences.

Finally, while this study highlights the influence of technology on orthographic practices, it does not explore the role of specific technological tools, such as mobile applications or educational software, in shaping these practices. Addressing this gap in future research could provide a more nuanced understanding of the interplay between technology and orthography in Gorontalo and other similar contexts.

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The authors have obtained informed consent from all participants.

Conflict of Interest

The authors declare that there is no conflict of interest.

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Original Research

Orthographic Representation of Long Vowels in Gorontalo: A Sociolinguistic Perspective on Tradition and Technology

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Abstract: This study examines the orthographic representation of long vowels in Gorontalo, focusing on the sociolinguistic interplay between tradition and technology. Data were collected from 213 respondents across six administrative regions using a mixed-methods approach to explore preferences for single graphemes, digraphs, and diacritics in varied sociocultural and technological contexts. The findings reveal distinct patterns: rural communities primarily retain single graphemes, reflecting oral traditions that emphasize suprasegmental features like rhythm and intonation. In contrast, urban areas adopt digraphs for their practicality in digital communication, while diacritics are predominantly confined to formal educational settings with minimal use in everyday contexts. Technology significantly shapes orthographic preferences, with digital tools promoting modern practices in urban areas, while technological limitations in rural regions sustain traditional systems. Education emerges as a pivotal factor, offering opportunities to reconcile local traditions with contemporary demands through community-based curricula. This study contributes to global discourses on orthographic representation, sociolinguistic identity, and the integration of tradition with technological advancements. The Gorontalo case illustrates how orthographic practices act as cultural artifacts, mediating identity and communication amid rapid social and technological change.

Keywords: *Orthographic Representation, Long Vowels, Gorontalo, Sociolinguistics, Digital Communication*

Introduction

Orthographic systems play a central role in supporting literacy, written communication, and cultural preservation, particularly in the context of minority languages that are vulnerable to the pressures of modernization. As the visual representation of spoken language, orthography enables the relationship between graphemes and phonemes to be translated into consistent and meaningful written forms (Coulmas 2003; Crystal 2018). However, for minority languages such as Gorontalo, the challenge of developing a stable and relevant orthographic system remains a pressing issue. In particular, inconsistencies in orthographic representation, especially of long vowels, pose significant barriers to literacy and intergenerational comprehension.

Long vowels serve an essential phonemic function in Gorontalo, where their presence directly affects word meaning. For instance, the words *tu'o* (vomit) and *tuu'o* (hidden) illustrate how variations in vowel length produce substantial semantic differences. Nevertheless, variability in writing practices—ranging from the use of diacritics, digraphs, or omission of vowel-length markers—frequently generates ambiguity, hindering literacy, and reducing clarity in written communication (Ladefoged and Johnson 2014).

This issue is not unique to Gorontalo. Similar challenges are observed in other minority languages worldwide. For example, in Botswana, orthographic inconsistencies in Khoisan languages have impeded literacy development and weakened cultural recognition (Chebanne 2016). In Laos, community-based reforms of the Hmong language's orthography successfully established a culturally relevant and phonologically accurate writing system, significantly improving literacy (Dubost et al. 2019). Likewise, in Vietnam, orthographic reforms in the Cham language have demonstrated how accurate phonological representation can strengthen literacy while revitalizing cultural identity.

In Indonesia, orthographic inconsistencies extend beyond Gorontalo to other regional languages, including Sundanese, Bugis, and Minangkabau. Challenges in representing phonological elements, such as vowel length, create obstacles to literacy, particularly among younger generations who are more accustomed to the standardized orthography of Indonesian. For Gorontalo, this issue is exacerbated by the dominance of Indonesian as the national language, which has increasingly replaced many functions of Gorontalo in daily communication.

Sociocultural dynamics also play a crucial role in shaping orthographic preferences among Gorontalo communities. Research indicates that orthographic conflicts often reflect underlying power hierarchies and language ideologies within societies (Villa and Vosters 2015). The dominance of Indonesian has not only accelerated the marginalization of Gorontalo but also created a disconnect between traditional practices and modern needs. Conversely, community-based approaches have proven effective in addressing such challenges. For example, Dondelewski and Czopek (2022) highlighted how local community involvement in orthographic reforms can strengthen a sense of ownership over the language and enhance consistency in writing systems.

Although substantial research has explored orthography in minority languages, most studies primarily focus on phonological and morphological descriptions, neglecting in-depth examination of sociocultural and technological dimensions. Community-based approaches, successfully implemented in orthographic reforms for languages such as Maori in New Zealand and Khoisan in South Africa, have yet to be widely applied to Gorontalo (Chebanne 2016; Smith 2022). Additionally, while advancements in digital tools such as local keyboards and artificial intelligence (AI)–powered applications show significant potential to enhance orthographic consistency, their utilization remains minimal in the context of Gorontalo.

The Gorontalo language faces substantial challenges due to orthographic inconsistencies, particularly in the representation of long vowels. The ambiguity arising from varying writing practices poses significant barriers to literacy and written communication. Moreover, the absence of clear orthographic guidelines, limited technological support, and the dominance of Indonesian exacerbate these issues. A holistic approach is therefore required to bridge the gaps between linguistic needs, sociocultural dynamics, and technological solutions for Gorontalo's writing system.

This study aims to examine the variations in the practice of writing long vowels across different regions of Gorontalo, with a particular focus on the distribution of graphemes, diacritics, and digraphs. Additionally, it seeks to analyze the influence of sociocultural factors, such as local traditions and generational differences, on the orthographic preferences among Gorontalo communities. Another key objective is to evaluate the impact of digital tools, including localized keyboards and AI-based applications, in enhancing orthographic consistency and helping to preserve the Gorontalo language.

The study addresses three primary aspects. First, from a linguistic perspective, it examines variations in the practice of writing long vowels across Gorontalo. Second, it explores the sociocultural dimensions of orthographic preferences, considering traditional values, generational differences, and social contexts. Finally, from a technological standpoint, the study evaluates the potential of digital tools to support orthographic consistency and promote language preservation.

Methodology

Research Approach

This study employs a descriptive–exploratory approach with mixed methods, integrating quantitative and qualitative data to provide a comprehensive understanding of the distribution of long vowel orthography in Gorontalo, as well as the sociocultural influences and the impact of technology and education on orthographic consistency. This approach was chosen, as it offers deeper insights than relying on a single method alone (Creswell and Creswell 2017; Tashakkori and Teddlie 2010). The descriptive–exploratory design was used to examine existing orthographic patterns, while the mixed-methods approach provided flexibility in combining statistical and thematic analyses (Yin 2018; Flick 2018).

Research Location and Participants

The research was conducted across six administrative regions in Gorontalo Province: Gorontalo City, Gorontalo Regency, Bone Bolango Regency, Boalemo Regency, Pohuwato Regency, and North Gorontalo Regency. These regions were selected to capture the social, cultural, and geographical diversity relevant to the distribution of orthographic practices. The

participants comprised 213 individuals selected through purposive sampling, a method suitable for qualitative research as it allows the selection of participants with in-depth knowledge of the study topic (Lawrence Neuman 2014; Etikan et al. 2016). Participants included students, teachers, indigenous community members, and digital technology users to capture the dynamics of orthography across domains such as formal education, digital communication, and local cultural traditions (Israel and Hay 2006).

Data Collection Procedures

Data were collected through surveys, semi-structured interviews, and focus group discussions (FGDs). Triangulation of data was employed to enhance the validity and reliability of the research findings by combining multiple methods and data sources (Denzin 2017).

1. Survey: The survey utilized structured questionnaires to document the distribution of long vowel orthographic practices, including diacritics, digraphs, and single graphemes. The survey provided quantitative data to capture general preferences across the six research locations (Bryman 2016; Field 2024).
2. Semi-Structured Interviews: Semi-structured interviews were designed to delve deeper into the sociocultural factors influencing orthographic preferences in Gorontalo. They allowed participants to elaborate on their preferences and the role of technology and education in shaping their orthographic practices (Guest et al. 2011).
3. Focus Group Discussions: Focus Group Discussions (FGDs) were conducted to discuss the opportunities and challenges in implementing a dual-system orthographic model. These discussions involved representatives from local communities, teachers, and language practitioners to identify needs and expectations for orthographic reform (Chebanne 2016; Smith 2022).

Research Instruments

This study employed three types of instruments:

1. Questionnaires: Used to measure the distribution of orthographic usage and participants' perceptions of orthographic consistency within their respective regions (Bryman 2016; Creswell and Poth 2016).
2. Interview Guides: Developed to explore social and technological dimensions of orthographic preferences (Lawrence Neuman 2014; Braun and Clarke 2006).
3. FGD Guidelines: Designed to analyze collective perspectives on the development and application of a dual-system orthographic model (Israel and Hay 2006; Creswell and Poth 2016).

Data Processing and Analysis Procedures

The data collected in this study were analyzed using both quantitative and qualitative approaches to ensure a comprehensive understanding of orthographic preferences across different research locations. The following methods were employed:

1. Quantitative Analysis: Data from the surveys were analyzed using descriptive statistics to identify the distribution of diacritics, digraphs, and single graphemes across the six research locations. This analysis provided a detailed understanding of orthographic preferences in various social contexts (Field 2024; Tashakkori and Teddlie 2010).
2. Qualitative Analysis: Data from interviews and FGDs were analyzed thematically to identify patterns, themes, and relationships relevant to the orthographic preferences of Gorontalo communities. This method is effective for exploring the sociocultural dimensions within the research context (Braun and Clarke 2006; Guest et al. 2011).

Ethical Considerations

This study adhered to research ethics guidelines by ensuring that all participants were fully informed about the research objectives, methods, and their rights as participants. Participation was voluntary, with written informed consent obtained from all participants. Data confidentiality was strictly maintained throughout the research process and subsequent publication (Israel and Hay 2006; Babbie 2020).

Data Reliability and Validity

To ensure data reliability and validity, a pilot test of the questionnaire was conducted with ten respondents before the main survey. Additionally, methodological triangulation was employed to compare findings from the survey, interviews, and FGDs, enhancing the credibility and trustworthiness of the research results (Denzin 2017; Lincoln and Guba 1985).

Results

Distribution of Long Vowel Orthographic Practices

With modernization, social media and digital communication have transformed how communities choose orthographic patterns, particularly in urban areas where efficiency emerges as a dominant factor (Baron 2010; Tagg and Seargeant 2021). However, tradition continues to play a significant role in rural areas, reflecting how communication patterns are preserved as a form of cultural identity (Finnegan 2012; Pauwels 2016).

The orthographic choices of Gorontalo communities highlight the interplay between cultural traditions, social dynamics, and technological influences. In this context, urban areas such as Gorontalo City exhibit progressive adoption of technology, with digraphs dominating orthographic practices. Conversely, rural areas like North Gorontalo and

Boalemo tend to retain single graphemes, aligning with oral traditions rich in suprasegmental elements such as intonation and rhythm (Harrison and Anderson 2008; Leith 2016).

These findings are visualized through grouped bar charts and heatmaps, offering comprehensive insights into the distribution of orthographic practices, driving factors, and respondent characteristics across the six regions of Gorontalo (see Figure 1).

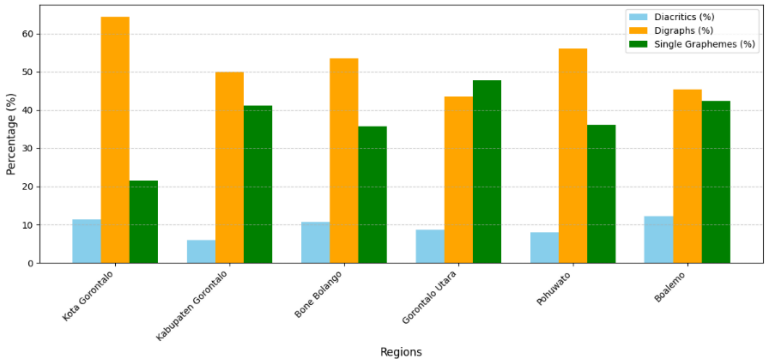

Figure 1: Distribution of Orthographic Practices Across Regions

The grouped bar chart illustrates the distribution of diacritics, digraphs, and single graphemes across six regions in Gorontalo. Gorontalo City demonstrates a dominance of digraphs (64.29%), reflecting the urban community's emphasis on efficiency in digital communication. Digraphs are preferred for their ability to expedite communication without compromising meaning, aligning with the findings of Herring et al. (2013), who noted that digital language prioritizes speed and practicality.

In contrast, rural regions like North Gorontalo exhibit a dominance of single graphemes (47.83%), closely tied to oral traditions. As explained by Ong and Hartley (2013), oral traditions rely heavily on suprasegmental features such as intonation and stress, with written forms functioning merely as complements to spoken language.

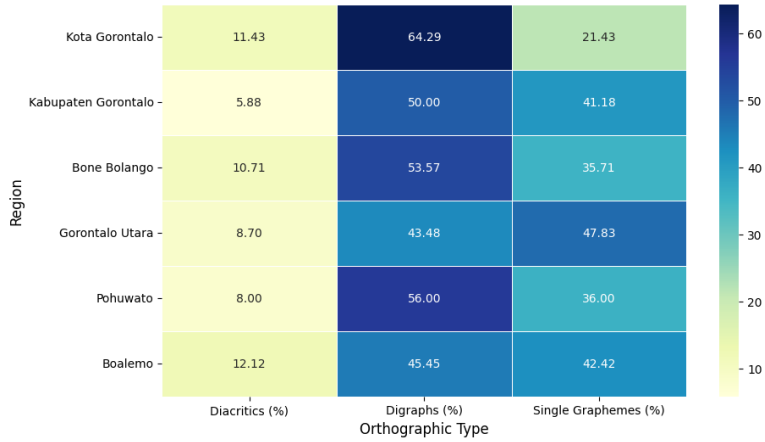

Figure 2: The Heatmap of Orthographic Practice by Region

The heatmap in Figure 2 emphasizes the orthographic variations across different regions. Darker shades in Gorontalo City highlight the dominance of digraphs, while North Gorontalo exhibits a high intensity of single grapheme usage. Regions such as Bone Bolango and Pohuwato display a more balanced distribution between digraphs and single graphemes, reflecting transitional areas that strive to integrate modernity with local traditions. This analysis aligns with Fishman's (2001) theory, which asserts that language patterns reflect the interaction between sociocultural dynamics and technological changes.

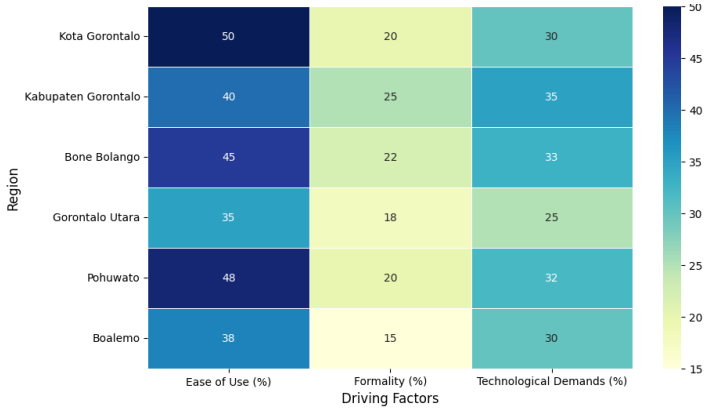

Figure 3: Heatmap of Driving Factors for Orthographic Preferences

The heatmap in Figure 3 illustrates the primary reasons behind orthographic choices across different regions. Gorontalo City stands out with "ease of use" as the dominant factor (50%), aligning with the demand for fast communication in digital spaces (Baron 2010; Tagg and Seargeant 2021). In contrast, the "more formal" factor is more prominent in semi-urban areas such as Gorontalo Regency (25%), reflecting the need to adapt orthographic practices to educational or official documentation contexts. Rural areas like North Gorontalo indicate that the "technological demand" factor has less influence compared to urban regions, consistent with limited access to technology in these areas.

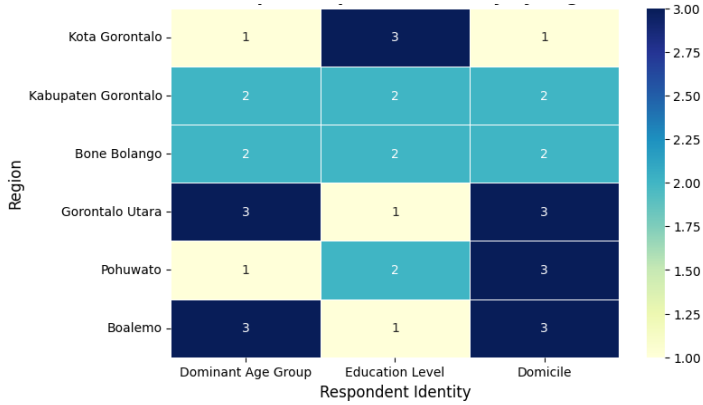

Figure 4: Heatmap of Respondent Identity by Region

The heatmap in Figure 4 provides insights into the social characteristics underlying orthographic preferences. Gorontalo City, dominated by a younger generation with higher education levels and urban residence, tends to favor digraphs as a symbol of modernity. Conversely, rural areas such as Boalemo and North Gorontalo, characterized by older generations with lower education levels and rural residence, prefer single graphemes to preserve traditional patterns. These findings align with Pauwels' (2016) theory, which posits that language and orthographic choices often reflect cultural identity.

The visualization illustrates that Gorontalo's orthographic preferences are shaped by the interaction between tradition, modernization, and social dynamics. Urban areas, such as Gorontalo City, exhibit high adoption of digraphs, driven by efficiency needs and the influence of digital technology. In contrast, rural areas like North Gorontalo maintain single graphemes as part of oral traditions, reflecting a strong cultural identity.

These findings highlight the importance of understanding the social and cultural context when analyzing language patterns. As noted by Crystal (2018) and Harrison and Anderson (2008), modernization does not entirely replace tradition but creates a hybridization of communication patterns. The results have significant implications for educational policies and cultural preservation, particularly in maintaining a balance between technology and tradition amid dynamic social changes.

The Relationship Between Social Context and Orthographic Preferences

The orthographic preferences of Gorontalo communities reflect the complex sociocultural dynamics deeply embedded in their social context. Orthographic patterns, such as digraphs, single graphemes, and diacritics, not only fulfill practical needs for communication but also illustrate how communities negotiate between modernity and tradition. On one hand, urban areas and social media promote more flexible and efficient orthographic patterns, such as digraphs, to facilitate rapid, technology-based communication. On the other hand, oral traditions and rural regions preserve more traditional patterns, such as single graphemes, which are closely tied to verbal practices and local cultural values (Crystal 2018; Finnegan 2012).

Previous studies indicate that modernization often drives shifts in communication patterns, particularly in the context of urbanization and the penetration of digital media (Labov 2006; Herring et al. 2013). However, in communities rooted in oral traditions, suprasegmental elements such as intonation, rhythm, and stress remain dominant factors in maintaining simple yet meaningful communication patterns (Duranti 1997; Ladefoged and Johnson 2014).

This study aims to uncover how differing social contexts influence the orthographic preferences of Gorontalo communities. The following data visualizations provide a detailed depiction of the distribution of orthographic preferences across various social contexts, including social media, urban and rural areas, and oral traditions.

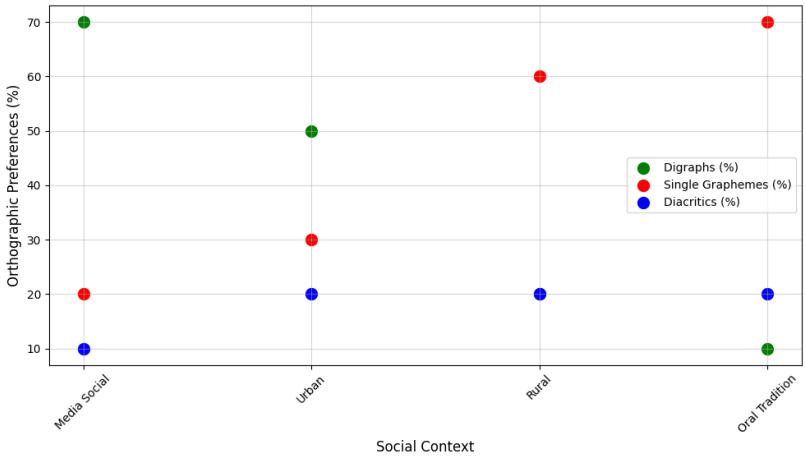

Figure 5: Scatter Plot: Relationship Between Social Context and Orthographic Preferences

The distribution of orthographic preferences, as depicted in Figure 5, reveals a clear relationship between social context and the written communication patterns of Gorontalo communities. Within oral traditions, single graphemes dominate with a proportion of 70%, reflecting the importance of suprasegmental elements in preserving message integrity and meaning, particularly in religious texts, folklore, and traditional rituals (Finnegan 2012; Yule 2022). Writing in this context functions as a complement to verbal communication rather than as a replacement or primary medium. Digraphs account for only 10% due to their limited relevance in culturally rooted communication, while diacritics (20%) play a significant role in emphasizing meaning in formal or religious texts.

In rural areas, which remain heavily reliant on oral traditions, a similar pattern is observed, with single graphemes still dominant at 60%. Suprasegmental elements such as intonation and stress continue to influence societal perceptions of writing as a tool that complements verbal communication. Folklore and religious texts, often employing rich verbal communication, make single graphemes more relevant than other patterns. Conversely, digraphs (20%) and diacritics (20%) play more limited roles as they are less aligned with the needs of conservative rural communities (Ong and Hartley 2013; Crystal 2018).

In urban areas, modernization begins to shape more complex and balanced communication patterns. Digraphs dominate at 50%, reflecting the need for efficiency in written communication, particularly in digital technology contexts (Herring et al. 2013; Fishman 2001). However, single graphemes (30%) and diacritics (20%) remain relevant, particularly in formal domains such as education and official documents. Urbanization introduces a pluralistic interaction between tradition and modernity, where traditional elements are preserved even as the influence of technology grows (Labov 2006).

In the context of social media, digraphs have the highest usage proportion at 70%, consistent with the platform's emphasis on efficiency and speed in communication. Single

graphemes are used at 20%, while diacritics account for 10%, reflecting a shift in orthographic preferences entirely focused on the practical needs of technology-based communication. Social media, as an informal communication space, demonstrates that the suprasegmental elements dominant in oral traditions hold little relevance in digital contexts (Duranti 1997; Crystal 2018).

These findings confirm significant differences in orthographic preferences based on the social contexts of Gorontalo. Oral traditions and rural areas maintain single graphemes as the dominant pattern, supported by the strong role of suprasegmental elements in sustaining local cultural continuity. Conversely, urban areas and social media show a preference for digraphs, reflecting the influence of modernization and technology in shaping more flexible and efficient communication patterns.

This study supports the view that tradition and modernity can coexist when a balance is maintained between preserving cultural identity and adapting to social change (Fishman 2001; Yule 2022). Although modernity continues to progress, these findings demonstrate that oral traditions remain a vital foundation for Gorontalo communities in navigating complex social dynamics. Orthographic choices not only reflect practical needs but also serve as symbols of cultural adaptation, preserving traditional roots amidst the tides of technological and global changes.

The Relationship Between Education and Orthographic Preferences

The orthographic preferences of Gorontalo communities are closely tied to education levels, reflecting not only practical needs in acquiring written language but also the sociocultural dynamics that shape communication patterns. Orthographic forms such as digraphs, single graphemes, and diacritics are utilized differently across educational stages, illustrating a shift between the need for efficiency, local traditions, and formal precision. Education serves not only as a means of language acquisition but also as a medium that bridges local traditions and modernization, as evidenced by the evolving orthographic preferences across different educational levels (Crystal 2018; Yule 2022).

At early educational stages, such as primary school, writing practices focus more on simple comprehension for practical communication. In contrast, at higher levels of education, the need for more formal and complex orthographic forms begins to emerge. This pattern demonstrates that education not only imparts technical writing skills but also shapes how students understand culture and tradition through written language (Finnegan 2012; Ong and Hartley 2013). To visually capture these dynamics, the following scatter plot illustrates the distribution of orthographic preferences across educational levels in Gorontalo.

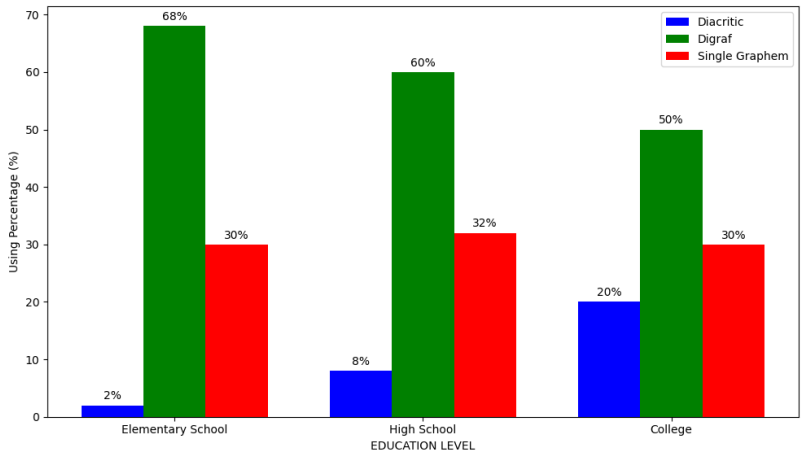

Figure 6: The Comparison Among Education Level and Orthographic Preferences in Gorontalo

The data visualization in Figure 6 reveals the distribution of orthographic preferences, illustrating the relationship between educational levels and the use of digraphs, single graphemes, and diacritics. At the primary school level, digraphs dominate with 68%, while single graphemes account for 30%, and diacritics only 2%. The dominance of digraphs reflects an early education approach emphasizing simplicity and efficiency in the learning process. Digraphs are more accessible to primary school students due to their straightforward nature, supporting foundational literacy skills in reading and writing. Meanwhile, the minimal use of diacritics indicates that linguistic formality is not a primary focus at this stage (Crystal 2018; Ladefoged and Johnson 2014).

At the secondary school level, while digraphs remain dominant at 60%, there is an increase in the use of single graphemes to 32% and diacritics to 8%. This pattern suggests that secondary education begins to introduce students to more complex and formal orthographic usage. The rising use of single graphemes may reflect the influence of local traditions, as this pattern is often associated with simplicity and cultural proximity, particularly in religious texts and traditional literature (Finnegan 2012; Ong and Hartley 2013). Conversely, the increased use of diacritics at this level indicates growing exposure to linguistic precision, especially in academic contexts or documents requiring formal expression.

At the higher education level, there is a significant shift in orthographic preferences. Digraphs decline to 50%, while single graphemes remain stable at 30%, and diacritics rise to 20%. This shift suggests that higher education emphasizes precision and formality in written communication. Diacritics become more relevant at this stage, particularly in academic or professional contexts where accuracy and detail are paramount. Meanwhile, digraphs, though still dominant, begin to decline as they do not always align with the demands of more formal communication. The stability of single grapheme usage across educational levels reflects the enduring influence of tradition, even as modernization continues to exert its impact (Labov 2006; Duranti 1997).

Orthographic preferences in Gorontalo reflect a complex interplay between educational levels, local traditions, and modernization. At the primary education level, the dominance of digraphs represents the need to simplify early learning, while at secondary and higher education levels, the demand for formality and precision increases, as evidenced by the growing use of diacritics. The consistent use of single graphemes across all educational stages underscores the importance of tradition in shaping the cultural identity of Gorontalo communities.

These findings support the view that education plays a vital role as a bridge between tradition and modernity. Education not only shapes students' technical writing abilities but also influences their perceptions of tradition and formality in written communication. In the context of Gorontalo society, education functions not only as a tool for modernization but also as a medium for preserving local cultural values, ensuring that shifts in communication patterns do not erase key elements of the community's identity (Crystal 2018; Yule 2022; Finnegan 2012; Herring et al. 2013).

Technological Implications for Orthographic Choices

The adoption of technology in Gorontalo communities demonstrates significant variations based on geographical location and social context. These patterns reflect the dynamics between modernity and tradition, where modern technologies such as social media and digital devices are more widely accepted in urban areas, while simpler technologies remain relevant in rural regions. These variations are not only influenced by generational preferences but are also shaped by technology accessibility, social needs, and levels of urbanization (Crystal 2018; Fishman 2001).

Key orthographic tools, such as keyboards, keypads, and touchscreens on digital devices, play a crucial role in shaping orthographic practices in Gorontalo. In the context of digital technology, these features influence the efficiency and ease of using various orthographic methods. This suggests that technological infrastructure is a critical factor in shaping how communities adapt to specific orthographic systems.

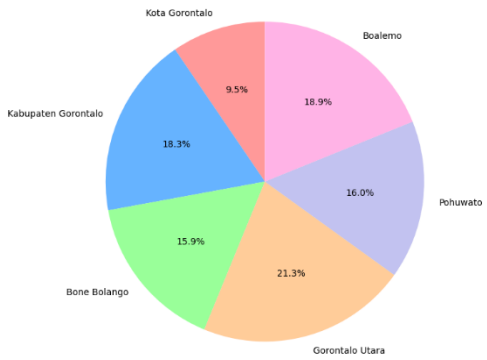

Figure 7: Proportion of Respondents Who Mentioned Technology as a Barrier

The pie chart in Figure 7 illustrates variations in perceptions of technology across six regions in Gorontalo. Rural areas, such as North Gorontalo (21.3%) and Boalemo (18.9%), have the highest percentage of respondents perceiving technology as a barrier. This indicates that limited technological infrastructure, low digital literacy, and inadequate training in using digital devices are significant challenges in these regions (Ong and Hartley 2013; Finnegan 2012). These barriers make it more difficult for rural communities to adopt modern technologies, resulting in a continued preference for simpler orthographic methods, such as single graphemes.

In contrast, Gorontalo City has the lowest percentage of respondents (9.5%) viewing technology as a hindrance. Higher rates of technology adaptation in urban areas are supported by better access to digital devices, higher levels of education, and greater exposure to social media. This pattern aligns with the findings of Herring et al. (2013), which demonstrate that adequate technological infrastructure fosters efficiency and flexibility in digital communication.

The variation in perceptions of technology across Gorontalo reflects the strong relationship between technological accessibility, infrastructure conditions, and sociocultural dynamics. In rural areas, technological barriers are more pronounced, sustaining traditional orthographic methods. Conversely, in urban areas like Gorontalo City, higher technological adaptation enables the use of more efficient methods, such as digraphs, in digital communication.

This analysis underscores the importance of improving technological access and digital literacy in rural areas to bridge the technological divide between regions. Moreover, these findings support the perspectives of Crystal (2018) and Pauwels (2016), who argue that technological modernization does not necessarily replace tradition but instead creates adaptive patterns influenced by local sociocultural contexts.

These results are consistent with global patterns, where urban regions tend to adopt technology more quickly due to advanced infrastructure and better access to education (Labov 2006). Conversely, rural areas, such as North Gorontalo and Boalemo, are often slower to integrate technology due to structural barriers, including high costs and limited resources (Duranti 1997; Fishman 2001).

The accompanying scatter plot visualizes the relationship between technological exposure and orthographic preferences, mapping the interaction of location and generational indicators. This scatter plot provides a quantitative perspective on how specific combinations of variables influence orthographic adaptation across different contexts.

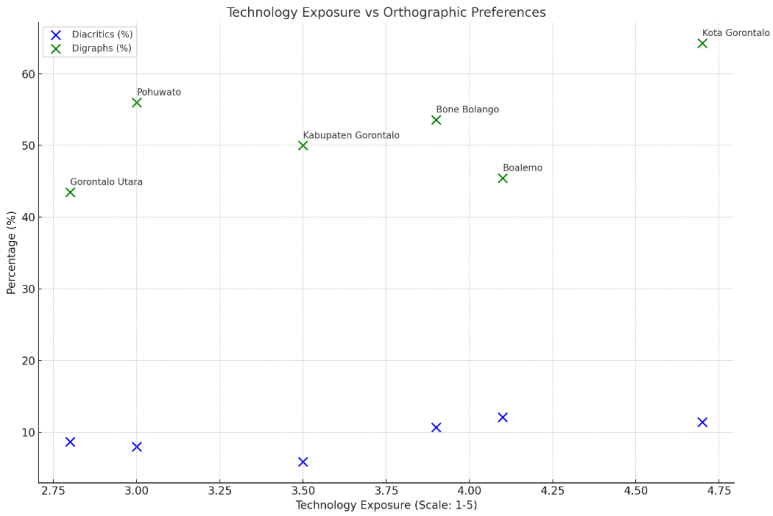

Figure 8: Relationship Between Technological Exposure and Orthographic Preferences

The scatter plot in Figure 8 provides a detailed perspective on the relevance of technology across different regions. The data reveal that areas with high technological exposure, such as Gorontalo City, show a strong preference for modern technology, as indicated by the dominance of digraphs (60%) as the primary orthographic pattern. This reflects the urban youth's demand for efficiency in technology-based communication (Herring et al. 2013). In contrast, regions such as North Gorontalo and Pohuwato, with lower technological exposure, are more inclined to maintain single graphemes as their main orthographic pattern, highlighting an attachment to tradition and limited access to technology.

The scatter plot also illustrates the relationship between generational relevance and social context. The range of relevance values (*Y*-axis) indicates that lower values (0–1) are predominantly found in rural areas, where technology is perceived as less relevant for younger generations. For instance, simpler technologies referred to as "rural technologies" dominate in regions like Pohuwato and North Gorontalo. Conversely, higher relevance values (3–5) are observed in urban areas such as Gorontalo City and Gorontalo Regency, where indicators like "social media" and "practicality" align more closely with the needs of the younger generation (Crystal 2018; Duranti 1997).

Additionally, the scatter plot highlights transitional regions such as Bone Bolango. This area demonstrates high relevance to mobile technologies ($Y = 3–4$), reflecting an adaptation phase where traditional elements persist, but modern technology adoption is increasing. Boalemo, on the other hand, shows the highest relevance ($Y = 5$) for the "practicality" indicator, indicating a strong demand for efficiency among the younger generation (Ong and Hartley 2013).

These visualizations complement one another in explaining the relationship between technological exposure, orthographic preferences, and perceptions of technological barriers

in Gorontalo. The pie chart reveals that regions with high perceptions of technological barriers tend to have low technological exposure and maintain traditional patterns, as seen in North Gorontalo and Boalemo. In contrast, the scatter plot indicates that regions with high technological exposure, such as Gorontalo City, favor modern patterns like digraphs.

This data confirm that technological exposure acts as a catalyst in shaping orthographic preferences, but the success of technology adoption heavily depends on social factors such as infrastructure, digital literacy, and local cultural values (Herring et al. 2013; Fishman 2001). While modernization drives technological adoption in urban areas, tradition continues to play a significant role in rural regions, particularly in sustaining patterns such as single graphemes.

These findings highlight how technology adoption in Gorontalo is influenced by the interplay of technological exposure, generational relevance, and social context. Urban areas like Gorontalo City exhibit more progressive technology adoption, with a strong preference for modern orthographic patterns like digraphs. Conversely, rural areas like North Gorontalo and Boalemo tend to preserve traditional patterns, reflecting cultural resistance to rapid technological modernization.

By combining quantitative and qualitative perspectives, this analysis provides deep insights into the technological divide between urban and rural areas. This approach not only maps the data distribution but also uncovers the social contexts underpinning these patterns. These findings offer a foundation for policy development aimed at reducing technological disparities, considering local needs and the potential for transitioning to modern technologies across Gorontalo's regions.

Discussion

Sociocultural Dimensions: Orthography as a Marker of Identity

The orthographic choices of Gorontalo communities reveal a close relationship between cultural practices and identity formation. Rural areas like North Gorontalo exhibit a dominance of single graphemes, reflecting oral traditions that prioritize suprasegmental elements such as intonation and stress over complex visual representations in writing. This underscores the role of orthography as a tool for preserving local cultural heritage, where writing serves as a supplementary rather than primary medium for communication (Finnegan 2012; Ong and Hartley 2013).

The use of single graphemes aligns with findings by Chebanne (2016) on Khoisan communities in Botswana, where simplified orthography helps sustain cultural identity amid marginalization. In Gorontalo, this choice similarly reflects resistance to modern pressures, as highlighted by Villa and Vosters (2015), who argue that orthography often becomes an ideological battleground for preserving local values against global dominance.

In contrast, urban areas like Gorontalo City exhibit a preference for digraphs, symbolizing efficiency and adaptation to modernity. As noted in Hillewaert's (2015) study

on social media, the use of digraphs reflects not only communicative functionality but also social identity, showcasing connectivity with digital technology. Globally, this shift illustrates urban communities' efforts to negotiate a modern identity while maintaining respect for cultural roots.

Technology and Orthographic Transformation

Technology serves as a major catalyst for changing orthographic patterns in urban Gorontalo. The preference for digraphs in digital environments reflects how tools like keyboards and touchscreens promoted efficient communication. Herring et al. (2013) highlights that digitalization often influences societies to prioritize methods of communication that are faster and easier to comprehend.

However, technology also reveals adoption disparities in rural areas. Higher perceptions of technological barriers in North Gorontalo and Boalemo reflect uneven access to technology. This factor reinforces the dominance of simple single graphemes, which better align with technological limitations in these regions (Mlambo and Matfunjwa 2024). Here, technology becomes not only a tool for transformation but also a symbol of social and geographical inequalities.

Nevertheless, the potential of technology to support cultural preservation cannot be overlooked. Weber et al.'s (2023) study on Blackfoot Words demonstrates how digital platforms can archive local languages and support community literacy. A similar approach could be applied in Gorontalo, leveraging technology to document oral traditions and strengthen single grapheme practices as part of local cultural preservation.

Education as a Bridge Between Tradition and Modernity

Education serves as a crucial arena for bridging the gap between tradition and modernity. The use of diacritics in formal institutions reflects efforts to maintain formality in written communication. However, data indicate that diacritics are used less frequently than digraphs or single graphemes, suggesting their limited functionality outside educational contexts.

This case parallels Dubost et al.'s (2019) findings on the Hmong community in Laos, where successful orthographic reforms involved local community engagement to create culturally relevant and functional systems. In Gorontalo, integrating local elements into the educational curriculum could enhance the relevance of formal orthography, such as diacritics, while addressing the needs of rural communities that prioritize single graphemes.

Additionally, research by Majorano et al. (2021) highlights that orthographic consistency plays a vital role in supporting literacy. Education can be a strategic tool for improving literacy in Gorontalo through community-based approaches that merge local traditions with modern technology. For example, educational programs that promote digraph use in urban areas and single graphemes in rural areas could bridge these gaps effectively.

Global Reflection: Social, Technological, and Policy Implications

The findings from Gorontalo illustrate how orthography functions as both a tool for cultural preservation and a symbol of modernity, aligning with global trends. Chebanne's (2016) study on African communities shows that simplified orthography can serve as a means of preserving tradition amid marginalization, while Hillewaert (2015) highlights the role of modern orthography in constructing identity within digital spaces.

In the context of Gorontalo, technology has the potential to simultaneously support cultural preservation and enhance communication efficiency. As suggested by Mlambo and Matfunjwa (2024) and Weber et al. (2023), digitalization can be an inclusive tool for improving literacy in rural areas without compromising traditional values. However, literacy policies must be designed to address technological disparities and ensure that local needs remain a priority.

Community involvement in orthographic development also emerges as a key factor for success, as demonstrated by Dondelewski and Czopek (2022). Similar initiatives in Gorontalo could include community-based programs to support the use of single graphemes and digraphs, reflecting local needs while reinforcing cultural identity.

Conclusion

The orthographic choices in Gorontalo reflect the dynamic interplay between cultural traditions and modernity, influenced significantly by sociocultural, technological, and educational factors. Rural areas tend to retain single graphemes as a reflection of oral traditions that emphasize suprasegmental elements and collective cultural identity. Conversely, urban areas demonstrate a dominance of digraphs, highlighting adaptation to digital technology and the demand for communication efficiency.

Education plays a pivotal role in bridging this divide, with significant potential to integrate traditional elements and modern needs through community-based curricula. Technology, while a driver of orthographic transformation in urban areas, continues to face significant challenges in rural regions due to infrastructure limitations and low digital literacy.

Globally, these findings align with similar phenomena in other regions, such as Africa and Southeast Asia, where orthography serves as both a tool for cultural preservation and a symbol of modernity. The results contribute to broader discussions on the relationship between orthography, identity, and social change, emphasizing the importance of community-based approaches in literacy development and orthographic policymaking.

Recommendations

Addressing the findings of this study requires strategic interventions that balance tradition, modernity, and local needs. One critical step is the enhancement of digital literacy in rural areas, where limited technological infrastructure and low digital literacy levels persist.

Community-based digital literacy programs tailored to local contexts can serve as a bridge, incorporating region-specific orthographic practices to empower rural communities in adapting to modern communication demands. Alongside this, educational curricula should reflect a dual approach: integrating single graphemes as symbols of cultural identity for rural regions, while promoting digraphs in urban areas to align with technological efficiency and global communication trends.

Further, the development of digital tools holds immense potential in supporting both tradition and modernization. Local governments and cultural organizations could collaborate to create applications or platforms that document oral traditions and reinforce single grapheme practices. Such tools not only preserve cultural identity but also foster literacy and modern communication skills. Community engagement is essential in these efforts; by involving local stakeholders in the design and standardization of orthographic systems, policies and tools can remain culturally relevant and practical. Lastly, continued research into the intersection of technology, literacy, and cultural preservation is crucial. Future studies should evaluate the long-term effects of technology-driven literacy policies, especially in rural areas, and investigate the sustainability of integrating traditional orthographic practices into modern technological contexts.

Limitations

Despite its contributions, this study has several limitations that should be acknowledged. The research's limited sample size and geographic coverage may constrain the generalizability of its findings to all regions of Gorontalo. Expanding the sample to include a broader demographic would provide more representative insights into orthographic preferences and practices. Furthermore, the study's focus on Gorontalo limits the applicability of its conclusions to other regions in Indonesia, underscoring the need for comparative studies across diverse linguistic and cultural contexts.

Another limitation is the absence of longitudinal data. This research provides a snapshot of orthographic preferences but does not examine how these preferences evolve over time in response to technological, educational, or sociocultural changes. Longitudinal studies could offer valuable insights into the sustainability of shifts in orthographic practices. Additionally, the lack of experimental approaches restricts the study's ability to measure the direct impact of interventions such as digital literacy training or community-based orthographic policies. Incorporating experimental designs in future research would help assess the effectiveness of specific strategies in transforming orthographic preferences.

Finally, while this study highlights the influence of technology on orthographic practices, it does not explore the role of specific technological tools, such as mobile applications or educational software, in shaping these practices. Addressing this gap in future research could provide a more nuanced understanding of the interplay between technology and orthography in Gorontalo and other similar contexts.

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Informed Consent

The authors have obtained informed consent from all participants.

Conflict of Interest

The authors declare that there is no conflict of interest.

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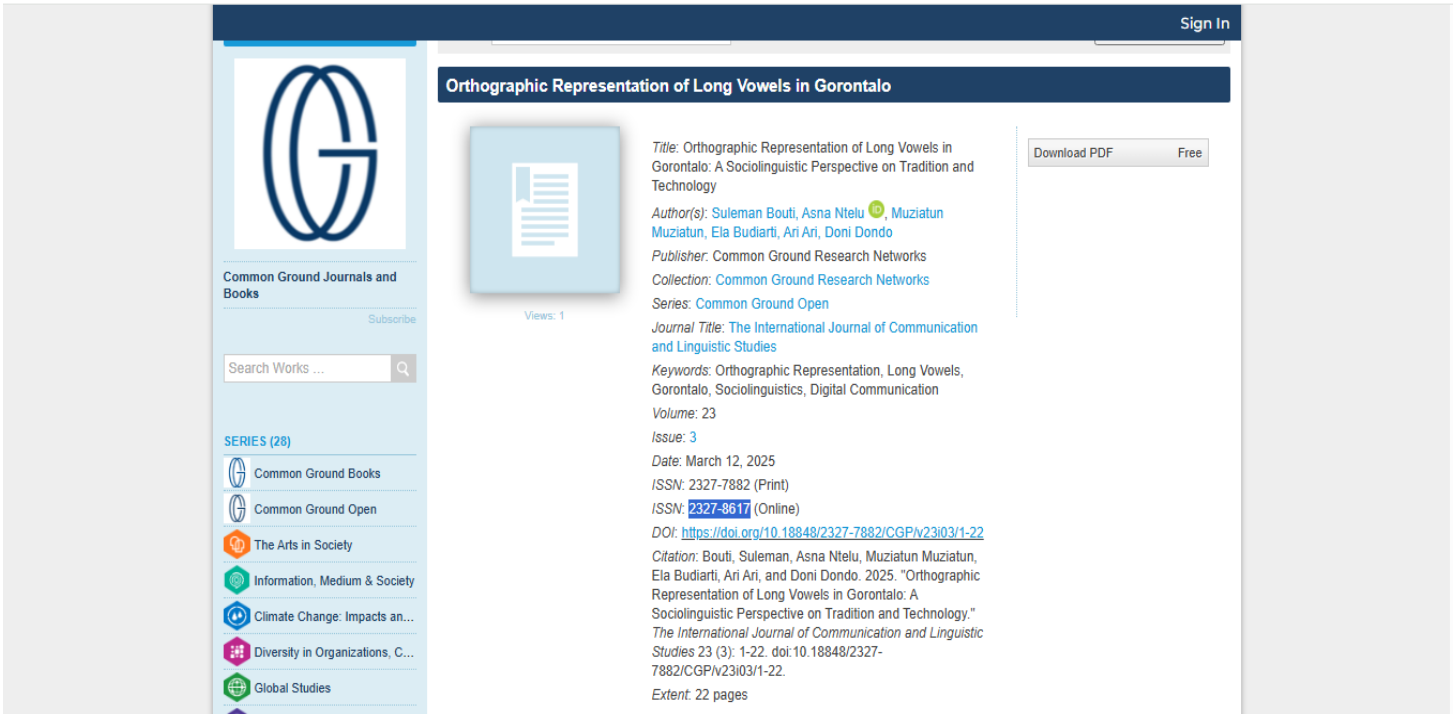

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Original Research

Orthographic Representation of Long Vowels in Gorontalo: A Sociolinguistic Perspective on Tradition and Technology

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Abstract: This study examines the orthographic representation of long vowels in Gorontalo, focusing on the sociolinguistic interplay between tradition and technology. Data were collected from 213 respondents across six administrative regions using a mixed-methods approach to explore preferences for single graphemes, digraphs, and diacritics in varied sociocultural and technological contexts. The findings reveal distinct patterns: rural communities primarily retain single graphemes, reflecting oral traditions that emphasize suprasegmental features like rhythm and intonation. In contrast, urban areas adopt digraphs for their practicality in digital communication, while diacritics are predominantly confined to formal educational settings with minimal use in everyday contexts. Technology significantly shapes orthographic preferences, with digital tools promoting modern practices in urban areas, while technological limitations in rural regions sustain traditional systems. Education emerges as a pivotal factor, offering opportunities to reconcile local traditions with contemporary demands through community-based curricula. This study contributes to global discourses on orthographic representation, sociolinguistic identity, and the integration of tradition with technological advancements. The Gorontalo case illustrates how orthographic practices act as cultural artifacts, mediating identity and communication amid rapid social and technological change.

Keywords: *Orthographic Representation, Long Vowels, Gorontalo, Sociolinguistics, Digital Communication*

Introduction

Orthographic systems play a central role in supporting literacy, written communication, and cultural preservation, particularly in the context of minority languages that are vulnerable to the pressures of modernization. As the visual representation of spoken language, orthography enables the relationship between graphemes and phonemes to be translated into consistent and meaningful written forms (Coulmas 2003; Crystal 2018). However, for minority languages such as Gorontalo, the challenge of developing a stable and relevant orthographic system remains a pressing issue. In particular, inconsistencies in orthographic representation, especially of long vowels, pose significant barriers to literacy and intergenerational comprehension.

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Long vowels serve an essential phonemic function in Gorontalo, where their presence directly affects word meaning. For instance, the words *tu'o* (vomit) and *tuu'o* (hidden) illustrate how variations in vowel length produce substantial semantic differences. Nevertheless, variability in writing practices—ranging from the use of diacritics, digraphs, or omission of vowel-length markers—frequently generates ambiguity, hindering literacy, and reducing clarity in written communication (Ladefoged and Johnson 2014).

This issue is not unique to Gorontalo. Similar challenges are observed in other minority languages worldwide. For example, in Botswana, orthographic inconsistencies in Khoisan languages have impeded literacy development and weakened cultural recognition (Chebanne 2016). In Laos, community-based reforms of the Hmong language's orthography successfully established a culturally relevant and phonologically accurate writing system, significantly improving literacy (Dubost et al. 2019). Likewise, in Vietnam, orthographic reforms in the Cham language have demonstrated how accurate phonological representation can strengthen literacy while revitalizing cultural identity.

In Indonesia, orthographic inconsistencies extend beyond Gorontalo to other regional languages, including Sundanese, Bugis, and Minangkabau. Challenges in representing phonological elements, such as vowel length, create obstacles to literacy, particularly among younger generations who are more accustomed to the standardized orthography of Indonesian. For Gorontalo, this issue is exacerbated by the dominance of Indonesian as the national language, which has increasingly replaced many functions of Gorontalo in daily communication.

Sociocultural dynamics also play a crucial role in shaping orthographic preferences among Gorontalo communities. Research indicates that orthographic conflicts often reflect underlying power hierarchies and language ideologies within societies (Villa and Vosters 2015). The dominance of Indonesian has not only accelerated the marginalization of Gorontalo but also created a disconnect between traditional practices and modern needs. Conversely, community-based approaches have proven effective in addressing such challenges. For example, Dondelewski and Czopek (2022) highlighted how local community involvement in orthographic reforms can strengthen a sense of ownership over the language and enhance consistency in writing systems.

Although substantial research has explored orthography in minority languages, most studies primarily focus on phonological and morphological descriptions, neglecting in-depth examination of sociocultural and technological dimensions. Community-based approaches, successfully implemented in orthographic reforms for languages such as Maori in New Zealand and Khoisan in South Africa, have yet to be widely applied to Gorontalo (Chebanne 2016; Smith 2022). Additionally, while advancements in digital tools such as local keyboards and artificial intelligence (AI)–powered applications show significant potential to enhance orthographic consistency, their utilization remains minimal in the context of Gorontalo.

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The Gorontalo language faces substantial challenges due to orthographic inconsistencies, particularly in the representation of long vowels. The ambiguity arising from varying writing practices poses significant barriers to literacy and written communication. Moreover, the absence of clear orthographic guidelines, limited technological support, and the dominance of Indonesian exacerbate these issues. A holistic approach is therefore required to bridge the gaps between linguistic needs, sociocultural dynamics, and technological solutions for Gorontalo's writing system.

This study aims to examine the variations in the practice of writing long vowels across different regions of Gorontalo, with a particular focus on the distribution of graphemes, diacritics, and digraphs. Additionally, it seeks to analyze the influence of sociocultural factors, such as local traditions and generational differences, on the orthographic preferences among Gorontalo communities. Another key objective is to evaluate the impact of digital tools, including localized keyboards and AI-based applications, in enhancing orthographic consistency and helping to preserve the Gorontalo language.

The study addresses three primary aspects. First, from a linguistic perspective, it examines variations in the practice of writing long vowels across Gorontalo. Second, it explores the sociocultural dimensions of orthographic preferences, considering traditional values, generational differences, and social contexts. Finally, from a technological standpoint, the study evaluates the potential of digital tools to support orthographic consistency and promote language preservation.

Methodology

Research Approach

This study employs a descriptive–exploratory approach with mixed methods, integrating quantitative and qualitative data to provide a comprehensive understanding of the distribution of long vowel orthography in Gorontalo, as well as the sociocultural influences and the impact of technology and education on orthographic consistency. This approach was chosen, as it offers deeper insights than relying on a single method alone (Creswell and Creswell 2017; Tashakkori and Teddlie 2010). The descriptive–exploratory design was used to examine existing orthographic patterns, while the mixed-methods approach provided flexibility in combining statistical and thematic analyses (Yin 2018; Flick 2018).

Research Location and Participants

The research was conducted across six administrative regions in Gorontalo Province: Gorontalo City, Gorontalo Regency, Bone Bolango Regency, Boalemo Regency, Pohuwato Regency, and North Gorontalo Regency. These regions were selected to capture the social, cultural, and geographical diversity relevant to the distribution of orthographic practices. The

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participants comprised 213 individuals selected through purposive sampling, a method suitable for qualitative research as it allows the selection of participants with in-depth knowledge of the study topic (Lawrence Neuman 2014; Etikan et al. 2016). Participants included students, teachers, indigenous community members, and digital technology users to capture the dynamics of orthography across domains such as formal education, digital communication, and local cultural traditions (Israel and Hay 2006).

Data Collection Procedures

Data were collected through surveys, semi-structured interviews, and focus group discussions (FGDs). Triangulation of data was employed to enhance the validity and reliability of the research findings by combining multiple methods and data sources (Denzin 2017).

1. Survey: The survey utilized structured questionnaires to document the distribution of long vowel orthographic practices, including diacritics, digraphs, and single graphemes. The survey provided quantitative data to capture general preferences across the six research locations (Bryman 2016; Field 2024).
2. Semi-Structured Interviews: Semi-structured interviews were designed to delve deeper into the sociocultural factors influencing orthographic preferences in Gorontalo. They allowed participants to elaborate on their preferences and the role of technology and education in shaping their orthographic practices (Guest et al. 2011).
3. Focus Group Discussions: Focus Group Discussions (FGDs) were conducted to discuss the opportunities and challenges in implementing a dual-system orthographic model. These discussions involved representatives from local communities, teachers, and language practitioners to identify needs and expectations for orthographic reform (Chebanne 2016; Smith 2022).

Research Instruments

This study employed three types of instruments:

1. Questionnaires: Used to measure the distribution of orthographic usage and participants' perceptions of orthographic consistency within their respective regions (Bryman 2016; Creswell and Poth 2016).
2. Interview Guides: Developed to explore social and technological dimensions of orthographic preferences (Lawrence Neuman 2014; Braun and Clarke 2006).
3. FGD Guidelines: Designed to analyze collective perspectives on the development and application of a dual-system orthographic model (Israel and Hay 2006; Creswell and Poth 2016).

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Data Processing and Analysis Procedures

The data collected in this study were analyzed using both quantitative and qualitative approaches to ensure a comprehensive understanding of orthographic preferences across different research locations. The following methods were employed:

1. Quantitative Analysis: Data from the surveys were analyzed using descriptive statistics to identify the distribution of diacritics, digraphs, and single graphemes across the six research locations. This analysis provided a detailed understanding of orthographic preferences in various social contexts (Field 2024; Tashakkori and Teddlie 2010).
2. Qualitative Analysis: Data from interviews and FGDs were analyzed thematically to identify patterns, themes, and relationships relevant to the orthographic preferences of Gorontalo communities. This method is effective for exploring the sociocultural dimensions within the research context (Braun and Clarke 2006; Guest et al. 2011).

Ethical Considerations

This study adhered to research ethics guidelines by ensuring that all participants were fully informed about the research objectives, methods, and their rights as participants. Participation was voluntary, with written informed consent obtained from all participants. Data confidentiality was strictly maintained throughout the research process and subsequent publication (Israel and Hay 2006; Babbie 2020).

Data Reliability and Validity

To ensure data reliability and validity, a pilot test of the questionnaire was conducted with ten respondents before the main survey. Additionally, methodological triangulation was employed to compare findings from the survey, interviews, and FGDs, enhancing the credibility and trustworthiness of the research results (Denzin 2017; Lincoln and Guba 1985).

Results

Distribution of Long Vowel Orthographic Practices

With modernization, social media and digital communication have transformed how communities choose orthographic patterns, particularly in urban areas where efficiency emerges as a dominant factor (Baron 2010; Tagg and Seargeant 2021). However, tradition continues to play a significant role in rural areas, reflecting how communication patterns are preserved as a form of cultural identity (Finnegan 2012; Pauwels 2016).

The orthographic choices of Gorontalo communities highlight the interplay between cultural traditions, social dynamics, and technological influences. In this context, urban areas such as Gorontalo City exhibit progressive adoption of technology, with digraphs dominating orthographic practices. Conversely, rural areas like North Gorontalo and

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Boalemo tend to retain single graphemes, aligning with oral traditions rich in suprasegmental elements such as intonation and rhythm (Harrison and Anderson 2008; Leith 2016).

These findings are visualized through grouped bar charts and heatmaps, offering comprehensive insights into the distribution of orthographic practices, driving factors, and respondent characteristics across the six regions of Gorontalo (see Figure 1).

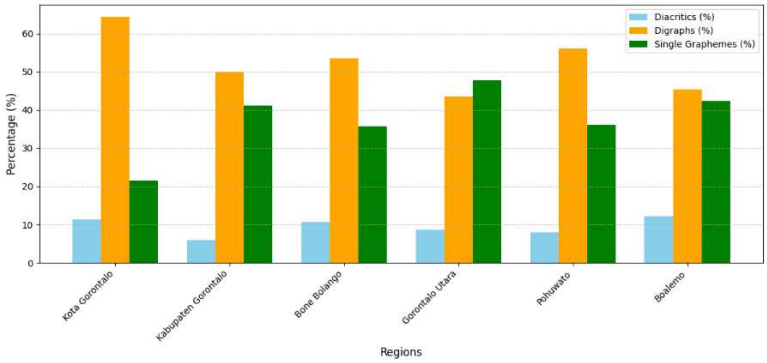

Figure 1: Distribution of Orthographic Practices Across Regions

The grouped bar chart illustrates the distribution of diacritics, digraphs, and single graphemes across six regions in Gorontalo. Gorontalo City demonstrates a dominance of digraphs (64.29%), reflecting the urban community's emphasis on efficiency in digital communication. Digraphs are preferred for their ability to expedite communication without compromising meaning, aligning with the findings of Herring et al. (2013), who noted that digital language prioritizes speed and practicality.

In contrast, rural regions like North Gorontalo exhibit a dominance of single graphemes (47.83%), closely tied to oral traditions. As explained by Ong and Hartley (2013), oral traditions rely heavily on suprasegmental features such as intonation and stress, with written forms functioning merely as complements to spoken language.

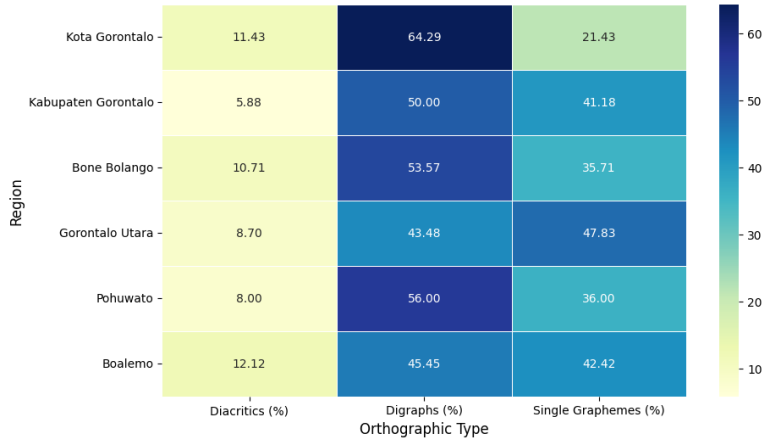

Figure 2: The Heatmap of Orthographic Practice by Region

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The heatmap in Figure 2 emphasizes the orthographic variations across different regions. Darker shades in Gorontalo City highlight the dominance of digraphs, while North Gorontalo exhibits a high intensity of single grapheme usage. Regions such as Bone Bolango and Pohuwato display a more balanced distribution between digraphs and single graphemes, reflecting transitional areas that strive to integrate modernity with local traditions. This analysis aligns with Fishman's (2001) theory, which asserts that language patterns reflect the interaction between sociocultural dynamics and technological changes.

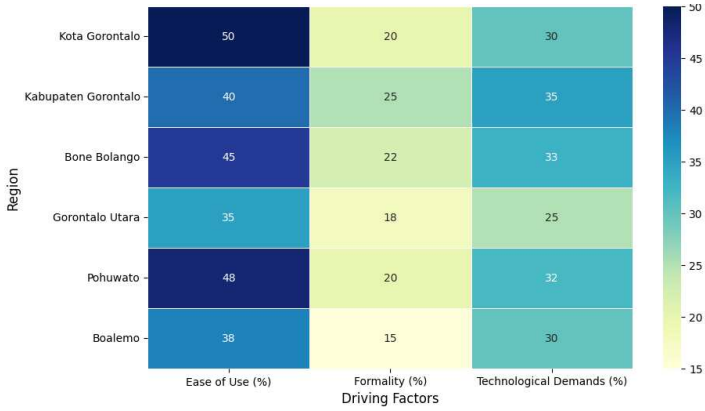

Figure 3: Heatmap of Driving Factors for Orthographic Preferences

The heatmap in Figure 3 illustrates the primary reasons behind orthographic choices across different regions. Gorontalo City stands out with "ease of use" as the dominant factor (50%), aligning with the demand for fast communication in digital spaces (Baron 2010; Tagg and Seargeant 2021). In contrast, the "more formal" factor is more prominent in semi-urban areas such as Gorontalo Regency (25%), reflecting the need to adapt orthographic practices to educational or official documentation contexts. Rural areas like North Gorontalo indicate that the "technological demand" factor has less influence compared to urban regions, consistent with limited access to technology in these areas.

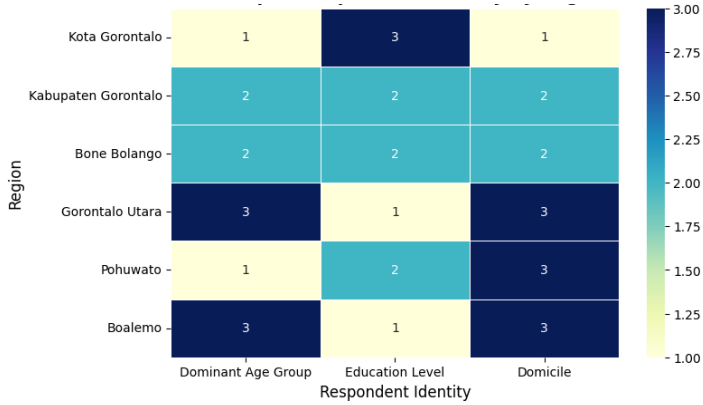

Figure 4: Heatmap of Respondent Identity by Region

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The heatmap in Figure 4 provides insights into the social characteristics underlying orthographic preferences. Gorontalo City, dominated by a younger generation with higher education levels and urban residence, tends to favor digraphs as a symbol of modernity. Conversely, rural areas such as Boalemo and North Gorontalo, characterized by older generations with lower education levels and rural residence, prefer single graphemes to preserve traditional patterns. These findings align with Pauwels' (2016) theory, which posits that language and orthographic choices often reflect cultural identity.

The visualization illustrates that Gorontalo's orthographic preferences are shaped by the interaction between tradition, modernization, and social dynamics. Urban areas, such as Gorontalo City, exhibit high adoption of digraphs, driven by efficiency needs and the influence of digital technology. In contrast, rural areas like North Gorontalo maintain single graphemes as part of oral traditions, reflecting a strong cultural identity.

These findings highlight the importance of understanding the social and cultural context when analyzing language patterns. As noted by Crystal (2018) and Harrison and Anderson (2008), modernization does not entirely replace tradition but creates a hybridization of communication patterns. The results have significant implications for educational policies and cultural preservation, particularly in maintaining a balance between technology and tradition amid dynamic social changes.

The Relationship Between Social Context and Orthographic Preferences

The orthographic preferences of Gorontalo communities reflect the complex sociocultural dynamics deeply embedded in their social context. Orthographic patterns, such as digraphs, single graphemes, and diacritics, not only fulfill practical needs for communication but also illustrate how communities negotiate between modernity and tradition. On one hand, urban areas and social media promote more flexible and efficient orthographic patterns, such as digraphs, to facilitate rapid, technology-based communication. On the other hand, oral traditions and rural regions preserve more traditional patterns, such as single graphemes, which are closely tied to verbal practices and local cultural values (Crystal 2018; Finnegan 2012).

Previous studies indicate that modernization often drives shifts in communication patterns, particularly in the context of urbanization and the penetration of digital media (Labov 2006; Herring et al. 2013). However, in communities rooted in oral traditions, suprasegmental elements such as intonation, rhythm, and stress remain dominant factors in maintaining simple yet meaningful communication patterns (Duranti 1997; Ladefoged and Johnson 2014).

This study aims to uncover how differing social contexts influence the orthographic preferences of Gorontalo communities. The following data visualizations provide a detailed depiction of the distribution of orthographic preferences across various social contexts, including social media, urban and rural areas, and oral traditions.

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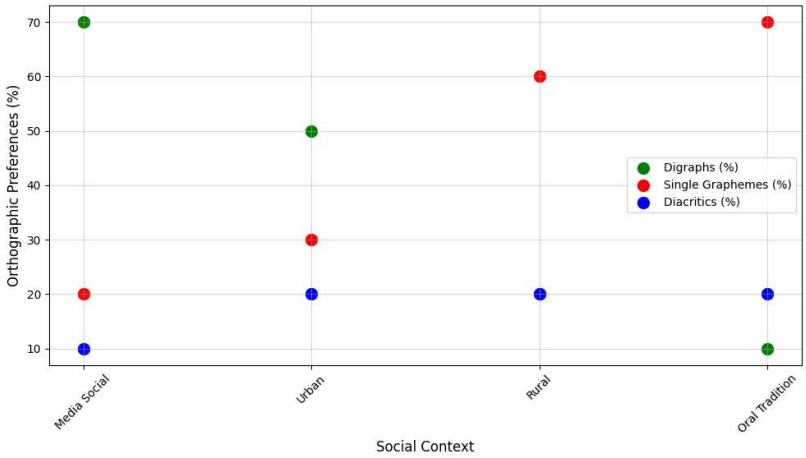

Figure 5: Scatter Plot: Relationship Between Social Context and Orthographic Preferences

The distribution of orthographic preferences, as depicted in Figure 5, reveals a clear relationship between social context and the written communication patterns of Gorontalo communities. Within oral traditions, single graphemes dominate with a proportion of 70%, reflecting the importance of suprasegmental elements in preserving message integrity and meaning, particularly in religious texts, folklore, and traditional rituals (Finnegan 2012; Yule 2022). Writing in this context functions as a complement to verbal communication rather than as a replacement or primary medium. Digraphs account for only 10% due to their limited relevance in culturally rooted communication, while diacritics (20%) play a significant role in emphasizing meaning in formal or religious texts.

In rural areas, which remain heavily reliant on oral traditions, a similar pattern is observed, with single graphemes still dominant at 60%. Suprasegmental elements such as intonation and stress continue to influence societal perceptions of writing as a tool that complements verbal communication. Folklore and religious texts, often employing rich verbal communication, make single graphemes more relevant than other patterns. Conversely, digraphs (20%) and diacritics (20%) play more limited roles as they are less aligned with the needs of conservative rural communities (Ong and Hartley 2013; Crystal 2018).

In urban areas, modernization begins to shape more complex and balanced communication patterns. Digraphs dominate at 50%, reflecting the need for efficiency in written communication, particularly in digital technology contexts (Herring et al. 2013; Fishman 2001). However, single graphemes (30%) and diacritics (20%) remain relevant, particularly in formal domains such as education and official documents. Urbanization introduces a pluralistic interaction between tradition and modernity, where traditional elements are preserved even as the influence of technology grows (Labov 2006).

In the context of social media, digraphs have the highest usage proportion at 70%, consistent with the platform's emphasis on efficiency and speed in communication. Single

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graphemes are used at 20%, while diacritics account for 10%, reflecting a shift in orthographic preferences entirely focused on the practical needs of technology-based communication. Social media, as an informal communication space, demonstrates that the suprasegmental elements dominant in oral traditions hold little relevance in digital contexts (Duranti 1997; Crystal 2018).

These findings confirm significant differences in orthographic preferences based on the social contexts of Gorontalo. Oral traditions and rural areas maintain single graphemes as the dominant pattern, supported by the strong role of suprasegmental elements in sustaining local cultural continuity. Conversely, urban areas and social media show a preference for digraphs, reflecting the influence of modernization and technology in shaping more flexible and efficient communication patterns.

This study supports the view that tradition and modernity can coexist when a balance is maintained between preserving cultural identity and adapting to social change (Fishman 2001; Yule 2022). Although modernity continues to progress, these findings demonstrate that oral traditions remain a vital foundation for Gorontalo communities in navigating complex social dynamics. Orthographic choices not only reflect practical needs but also serve as symbols of cultural adaptation, preserving traditional roots amidst the tides of technological and global changes.

The Relationship Between Education and Orthographic Preferences

The orthographic preferences of Gorontalo communities are closely tied to education levels, reflecting not only practical needs in acquiring written language but also the sociocultural dynamics that shape communication patterns. Orthographic forms such as digraphs, single graphemes, and diacritics are utilized differently across educational stages, illustrating a shift between the need for efficiency, local traditions, and formal precision. Education serves not only as a means of language acquisition but also as a medium that bridges local traditions and modernization, as evidenced by the evolving orthographic preferences across different educational levels (Crystal 2018; Yule 2022).

At early educational stages, such as primary school, writing practices focus more on simple comprehension for practical communication. In contrast, at higher levels of education, the need for more formal and complex orthographic forms begins to emerge. This pattern demonstrates that education not only imparts technical writing skills but also shapes how students understand culture and tradition through written language (Finnegan 2012; Ong and Hartley 2013). To visually capture these dynamics, the following scatter plot illustrates the distribution of orthographic preferences across educational levels in Gorontalo.

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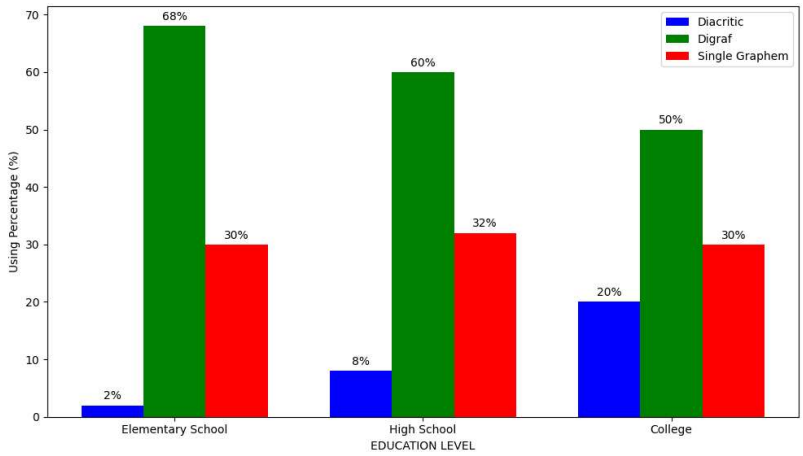

Figure 6: The Comparison Among Education Level and Orthographic Preferences in Gorontalo

The data visualization in Figure 6 reveals the distribution of orthographic preferences, illustrating the relationship between educational levels and the use of digraphs, single graphemes, and diacritics. At the primary school level, digraphs dominate with 68%, while single graphemes account for 30%, and diacritics only 2%. The dominance of digraphs reflects an early education approach emphasizing simplicity and efficiency in the learning process. Digraphs are more accessible to primary school students due to their straightforward nature, supporting foundational literacy skills in reading and writing. Meanwhile, the minimal use of diacritics indicates that linguistic formality is not a primary focus at this stage (Crystal 2018; Ladefoged and Johnson 2014).

At the secondary school level, while digraphs remain dominant at 60%, there is an increase in the use of single graphemes to 32% and diacritics to 8%. This pattern suggests that secondary education begins to introduce students to more complex and formal orthographic usage. The rising use of single graphemes may reflect the influence of local traditions, as this pattern is often associated with simplicity and cultural proximity, particularly in religious texts and traditional literature (Finnegan 2012; Ong and Hartley 2013). Conversely, the increased use of diacritics at this level indicates growing exposure to linguistic precision, especially in academic contexts or documents requiring formal expression.

At the higher education level, there is a significant shift in orthographic preferences. Digraphs decline to 50%, while single graphemes remain stable at 30%, and diacritics rise to 20%. This shift suggests that higher education emphasizes precision and formality in written communication. Diacritics become more relevant at this stage, particularly in academic or professional contexts where accuracy and detail are paramount. Meanwhile, digraphs, though still dominant, begin to decline as they do not always align with the demands of more formal communication. The stability of single grapheme usage across educational levels reflects the enduring influence of tradition, even as modernization continues to exert its impact (Labov 2006; Duranti 1997).

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Orthographic preferences in Gorontalo reflect a complex interplay between educational levels, local traditions, and modernization. At the primary education level, the dominance of digraphs represents the need to simplify early learning, while at secondary and higher education levels, the demand for formality and precision increases, as evidenced by the growing use of diacritics. The consistent use of single graphemes across all educational stages underscores the importance of tradition in shaping the cultural identity of Gorontalo communities.

These findings support the view that education plays a vital role as a bridge between tradition and modernity. Education not only shapes students' technical writing abilities but also influences their perceptions of tradition and formality in written communication. In the context of Gorontalo society, education functions not only as a tool for modernization but also as a medium for preserving local cultural values, ensuring that shifts in communication patterns do not erase key elements of the community's identity (Crystal 2018; Yule 2022; Finnegan 2012; Herring et al. 2013).

Technological Implications for Orthographic Choices

The adoption of technology in Gorontalo communities demonstrates significant variations based on geographical location and social context. These patterns reflect the dynamics between modernity and tradition, where modern technologies such as social media and digital devices are more widely accepted in urban areas, while simpler technologies remain relevant in rural regions. These variations are not only influenced by generational preferences but are also shaped by technology accessibility, social needs, and levels of urbanization (Crystal 2018; Fishman 2001).

Key orthographic tools, such as keyboards, keypads, and touchscreens on digital devices, play a crucial role in shaping orthographic practices in Gorontalo. In the context of digital technology, these features influence the efficiency and ease of using various orthographic methods. This suggests that technological infrastructure is a critical factor in shaping how communities adapt to specific orthographic systems.

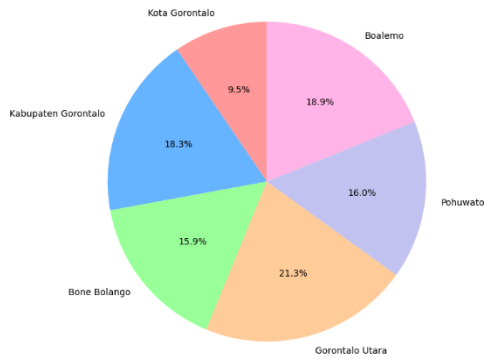

Figure 7: Proportion of Respondents Who Mentioned Technology as a Barrier

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The pie chart in Figure 7 illustrates variations in perceptions of technology across six regions in Gorontalo. Rural areas, such as North Gorontalo (21.3%) and Boalemo (18.9%), have the highest percentage of respondents perceiving technology as a barrier. This indicates that limited technological infrastructure, low digital literacy, and inadequate training in using digital devices are significant challenges in these regions (Ong and Hartley 2013; Finnegan 2012). These barriers make it more difficult for rural communities to adopt modern technologies, resulting in a continued preference for simpler orthographic methods, such as single graphemes.

In contrast, Gorontalo City has the lowest percentage of respondents (9.5%) viewing technology as a hindrance. Higher rates of technology adaptation in urban areas are supported by better access to digital devices, higher levels of education, and greater exposure to social media. This pattern aligns with the findings of Herring et al. (2013), which demonstrate that adequate technological infrastructure fosters efficiency and flexibility in digital communication.

The variation in perceptions of technology across Gorontalo reflects the strong relationship between technological accessibility, infrastructure conditions, and sociocultural dynamics. In rural areas, technological barriers are more pronounced, sustaining traditional orthographic methods. Conversely, in urban areas like Gorontalo City, higher technological adaptation enables the use of more efficient methods, such as digraphs, in digital communication.

This analysis underscores the importance of improving technological access and digital literacy in rural areas to bridge the technological divide between regions. Moreover, these findings support the perspectives of Crystal (2018) and Pauwels (2016), who argue that technological modernization does not necessarily replace tradition but instead creates adaptive patterns influenced by local sociocultural contexts.

These results are consistent with global patterns, where urban regions tend to adopt technology more quickly due to advanced infrastructure and better access to education (Labov 2006). Conversely, rural areas, such as North Gorontalo and Boalemo, are often slower to integrate technology due to structural barriers, including high costs and limited resources (Duranti 1997; Fishman 2001).

The accompanying scatter plot visualizes the relationship between technological exposure and orthographic preferences, mapping the interaction of location and generational indicators. This scatter plot provides a quantitative perspective on how specific combinations of variables influence orthographic adaptation across different contexts.

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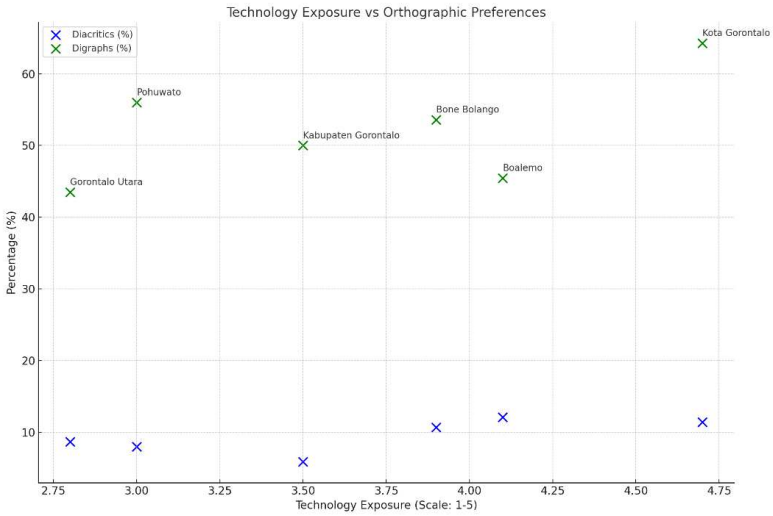

Figure 8: Relationship Between Technological Exposure and Orthographic Preferences

The scatter plot in Figure 8 provides a detailed perspective on the relevance of technology across different regions. The data reveal that areas with high technological exposure, such as Gorontalo City, show a strong preference for modern technology, as indicated by the dominance of digraphs (60%) as the primary orthographic pattern. This reflects the urban youth's demand for efficiency in technology-based communication (Herring et al. 2013). In contrast, regions such as North Gorontalo and Pohuwato, with lower technological exposure, are more inclined to maintain single graphemes as their main orthographic pattern, highlighting an attachment to tradition and limited access to technology.

The scatter plot also illustrates the relationship between generational relevance and social context. The range of relevance values (*Y*-axis) indicates that lower values (0–1) are predominantly found in rural areas, where technology is perceived as less relevant for younger generations. For instance, simpler technologies referred to as "rural technologies" dominate in regions like Pohuwato and North Gorontalo. Conversely, higher relevance values (3–5) are observed in urban areas such as Gorontalo City and Gorontalo Regency, where indicators like "social media" and "practicality" align more closely with the needs of the younger generation (Crystal 2018; Duranti 1997).

Additionally, the scatter plot highlights transitional regions such as Bone Bolango. This area demonstrates high relevance to mobile technologies ($Y = 3–4$), reflecting an adaptation phase where traditional elements persist, but modern technology adoption is increasing. Boalemo, on the other hand, shows the highest relevance ($Y = 5$) for the "practicality" indicator, indicating a strong demand for efficiency among the younger generation (Ong and Hartley 2013).

These visualizations complement one another in explaining the relationship between technological exposure, orthographic preferences, and perceptions of technological barriers

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in Gorontalo. The pie chart reveals that regions with high perceptions of technological barriers tend to have low technological exposure and maintain traditional patterns, as seen in North Gorontalo and Boalemo. In contrast, the scatter plot indicates that regions with high technological exposure, such as Gorontalo City, favor modern patterns like digraphs.

This data confirm that technological exposure acts as a catalyst in shaping orthographic preferences, but the success of technology adoption heavily depends on social factors such as infrastructure, digital literacy, and local cultural values (Herring et al. 2013; Fishman 2001). While modernization drives technological adoption in urban areas, tradition continues to play a significant role in rural regions, particularly in sustaining patterns such as single graphemes.

These findings highlight how technology adoption in Gorontalo is influenced by the interplay of technological exposure, generational relevance, and social context. Urban areas like Gorontalo City exhibit more progressive technology adoption, with a strong preference for modern orthographic patterns like digraphs. Conversely, rural areas like North Gorontalo and Boalemo tend to preserve traditional patterns, reflecting cultural resistance to rapid technological modernization.

By combining quantitative and qualitative perspectives, this analysis provides deep insights into the technological divide between urban and rural areas. This approach not only maps the data distribution but also uncovers the social contexts underpinning these patterns. These findings offer a foundation for policy development aimed at reducing technological disparities, considering local needs and the potential for transitioning to modern technologies across Gorontalo's regions.

Discussion

Sociocultural Dimensions: Orthography as a Marker of Identity

The orthographic choices of Gorontalo communities reveal a close relationship between cultural practices and identity formation. Rural areas like North Gorontalo exhibit a dominance of single graphemes, reflecting oral traditions that prioritize suprasegmental elements such as intonation and stress over complex visual representations in writing. This underscores the role of orthography as a tool for preserving local cultural heritage, where writing serves as a supplementary rather than primary medium for communication (Finnegan 2012; Ong and Hartley 2013).

The use of single graphemes aligns with findings by Chebanne (2016) on Khoisan communities in Botswana, where simplified orthography helps sustain cultural identity amid marginalization. In Gorontalo, this choice similarly reflects resistance to modern pressures, as highlighted by Villa and Vosters (2015), who argue that orthography often becomes an ideological battleground for preserving local values against global dominance.

In contrast, urban areas like Gorontalo City exhibit a preference for digraphs, symbolizing efficiency and adaptation to modernity. As noted in Hillewaert's (2015) study

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on social media, the use of digraphs reflects not only communicative functionality but also social identity, showcasing connectivity with digital technology. Globally, this shift illustrates urban communities' efforts to negotiate a modern identity while maintaining respect for cultural roots.

Technology and Orthographic Transformation

Technology serves as a major catalyst for changing orthographic patterns in urban Gorontalo. The preference for digraphs in digital environments reflects how tools like keyboards and touchscreens promoted efficient communication. Herring et al. (2013) highlights that digitalization often influences societies to prioritize methods of communication that are faster and easier to comprehend.

However, technology also reveals adoption disparities in rural areas. Higher perceptions of technological barriers in North Gorontalo and Boalemo reflect uneven access to technology. This factor reinforces the dominance of simple single graphemes, which better align with technological limitations in these regions (Mlambo and Matfunjwa 2024). Here, technology becomes not only a tool for transformation but also a symbol of social and geographical inequalities.

Nevertheless, the potential of technology to support cultural preservation cannot be overlooked. Weber et al.'s (2023) study on Blackfoot Words demonstrates how digital platforms can archive local languages and support community literacy. A similar approach could be applied in Gorontalo, leveraging technology to document oral traditions and strengthen single grapheme practices as part of local cultural preservation.

Education as a Bridge Between Tradition and Modernity

Education serves as a crucial arena for bridging the gap between tradition and modernity. The use of diacritics in formal institutions reflects efforts to maintain formality in written communication. However, data indicate that diacritics are used less frequently than digraphs or single graphemes, suggesting their limited functionality outside educational contexts.

This case parallels Dubost et al.'s (2019) findings on the Hmong community in Laos, where successful orthographic reforms involved local community engagement to create culturally relevant and functional systems. In Gorontalo, integrating local elements into the educational curriculum could enhance the relevance of formal orthography, such as diacritics, while addressing the needs of rural communities that prioritize single graphemes.

Additionally, research by Majorano et al. (2021) highlights that orthographic consistency plays a vital role in supporting literacy. Education can be a strategic tool for improving literacy in Gorontalo through community-based approaches that merge local traditions with modern technology. For example, educational programs that promote digraph use in urban areas and single graphemes in rural areas could bridge these gaps effectively.

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Global Reflection: Social, Technological, and Policy Implications

The findings from Gorontalo illustrate how orthography functions as both a tool for cultural preservation and a symbol of modernity, aligning with global trends. Chebanne's (2016) study on African communities shows that simplified orthography can serve as a means of preserving tradition amid marginalization, while Hillewaert (2015) highlights the role of modern orthography in constructing identity within digital spaces.

In the context of Gorontalo, technology has the potential to simultaneously support cultural preservation and enhance communication efficiency. As suggested by Mlambo and Matfunjwa (2024) and Weber et al. (2023), digitalization can be an inclusive tool for improving literacy in rural areas without compromising traditional values. However, literacy policies must be designed to address technological disparities and ensure that local needs remain a priority.

Community involvement in orthographic development also emerges as a key factor for success, as demonstrated by Dondelewski and Czopek (2022). Similar initiatives in Gorontalo could include community-based programs to support the use of single graphemes and digraphs, reflecting local needs while reinforcing cultural identity.

Conclusion

The orthographic choices in Gorontalo reflect the dynamic interplay between cultural traditions and modernity, influenced significantly by sociocultural, technological, and educational factors. Rural areas tend to retain single graphemes as a reflection of oral traditions that emphasize suprasegmental elements and collective cultural identity. Conversely, urban areas demonstrate a dominance of digraphs, highlighting adaptation to digital technology and the demand for communication efficiency.

Education plays a pivotal role in bridging this divide, with significant potential to integrate traditional elements and modern needs through community-based curricula. Technology, while a driver of orthographic transformation in urban areas, continues to face significant challenges in rural regions due to infrastructure limitations and low digital literacy.

Globally, these findings align with similar phenomena in other regions, such as Africa and Southeast Asia, where orthography serves as both a tool for cultural preservation and a symbol of modernity. The results contribute to broader discussions on the relationship between orthography, identity, and social change, emphasizing the importance of community-based approaches in literacy development and orthographic policymaking.

Recommendations

Addressing the findings of this study requires strategic interventions that balance tradition, modernity, and local needs. One critical step is the enhancement of digital literacy in rural areas, where limited technological infrastructure and low digital literacy levels persist.

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Community-based digital literacy programs tailored to local contexts can serve as a bridge, incorporating region-specific orthographic practices to empower rural communities in adapting to modern communication demands. Alongside this, educational curricula should reflect a dual approach: integrating single graphemes as symbols of cultural identity for rural regions, while promoting digraphs in urban areas to align with technological efficiency and global communication trends.

Further, the development of digital tools holds immense potential in supporting both tradition and modernization. Local governments and cultural organizations could collaborate to create applications or platforms that document oral traditions and reinforce single grapheme practices. Such tools not only preserve cultural identity but also foster literacy and modern communication skills. Community engagement is essential in these efforts; by involving local stakeholders in the design and standardization of orthographic systems, policies and tools can remain culturally relevant and practical. Lastly, continued research into the intersection of technology, literacy, and cultural preservation is crucial. Future studies should evaluate the long-term effects of technology-driven literacy policies, especially in rural areas, and investigate the sustainability of integrating traditional orthographic practices into modern technological contexts.

Limitations

Despite its contributions, this study has several limitations that should be acknowledged. The research's limited sample size and geographic coverage may constrain the generalizability of its findings to all regions of Gorontalo. Expanding the sample to include a broader demographic would provide more representative insights into orthographic preferences and practices. Furthermore, the study's focus on Gorontalo limits the applicability of its conclusions to other regions in Indonesia, underscoring the need for comparative studies across diverse linguistic and cultural contexts.

Another limitation is the absence of longitudinal data. This research provides a snapshot of orthographic preferences but does not examine how these preferences evolve over time in response to technological, educational, or sociocultural changes. Longitudinal studies could offer valuable insights into the sustainability of shifts in orthographic practices. Additionally, the lack of experimental approaches restricts the study's ability to measure the direct impact of interventions such as digital literacy training or community-based orthographic policies. Incorporating experimental designs in future research would help assess the effectiveness of specific strategies in transforming orthographic preferences.

Finally, while this study highlights the influence of technology on orthographic practices, it does not explore the role of specific technological tools, such as mobile applications or educational software, in shaping these practices. Addressing this gap in future research could provide a more nuanced understanding of the interplay between technology and orthography in Gorontalo and other similar contexts.

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Informed Consent

The authors have obtained informed consent from all participants.

Conflict of Interest

The authors declare that there is no conflict of interest.

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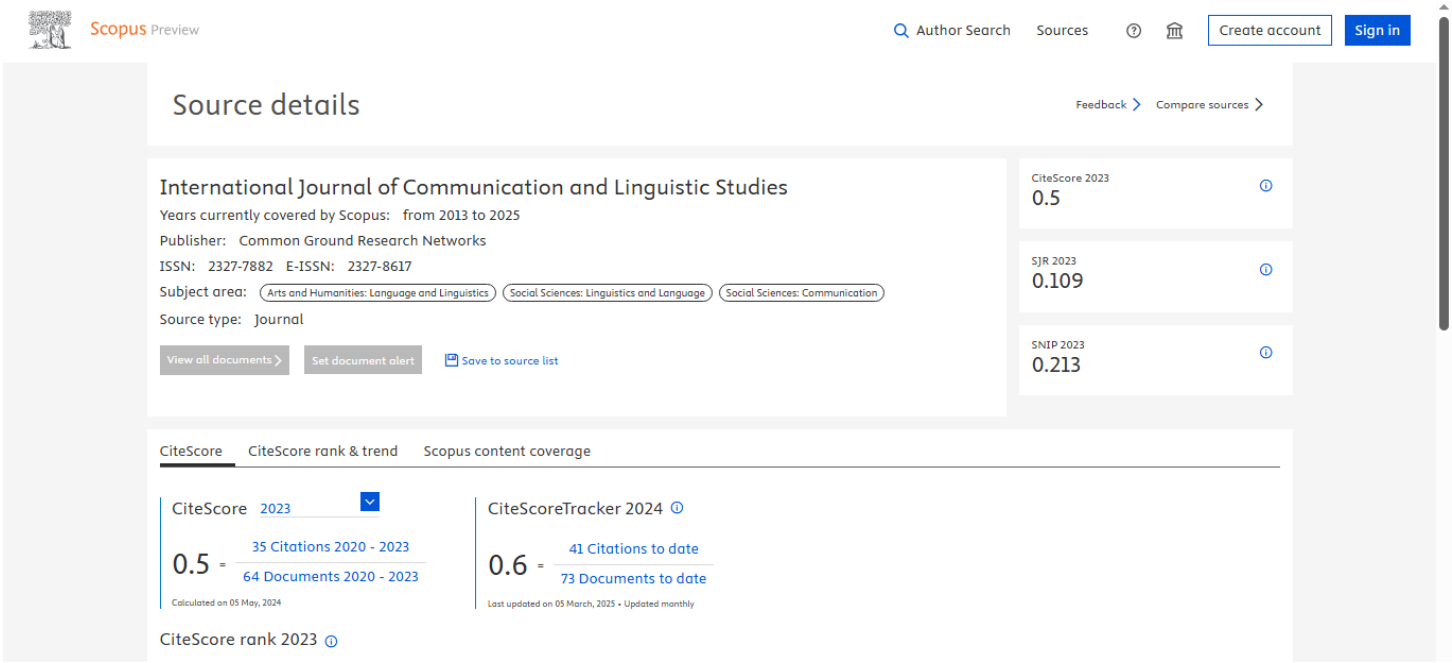

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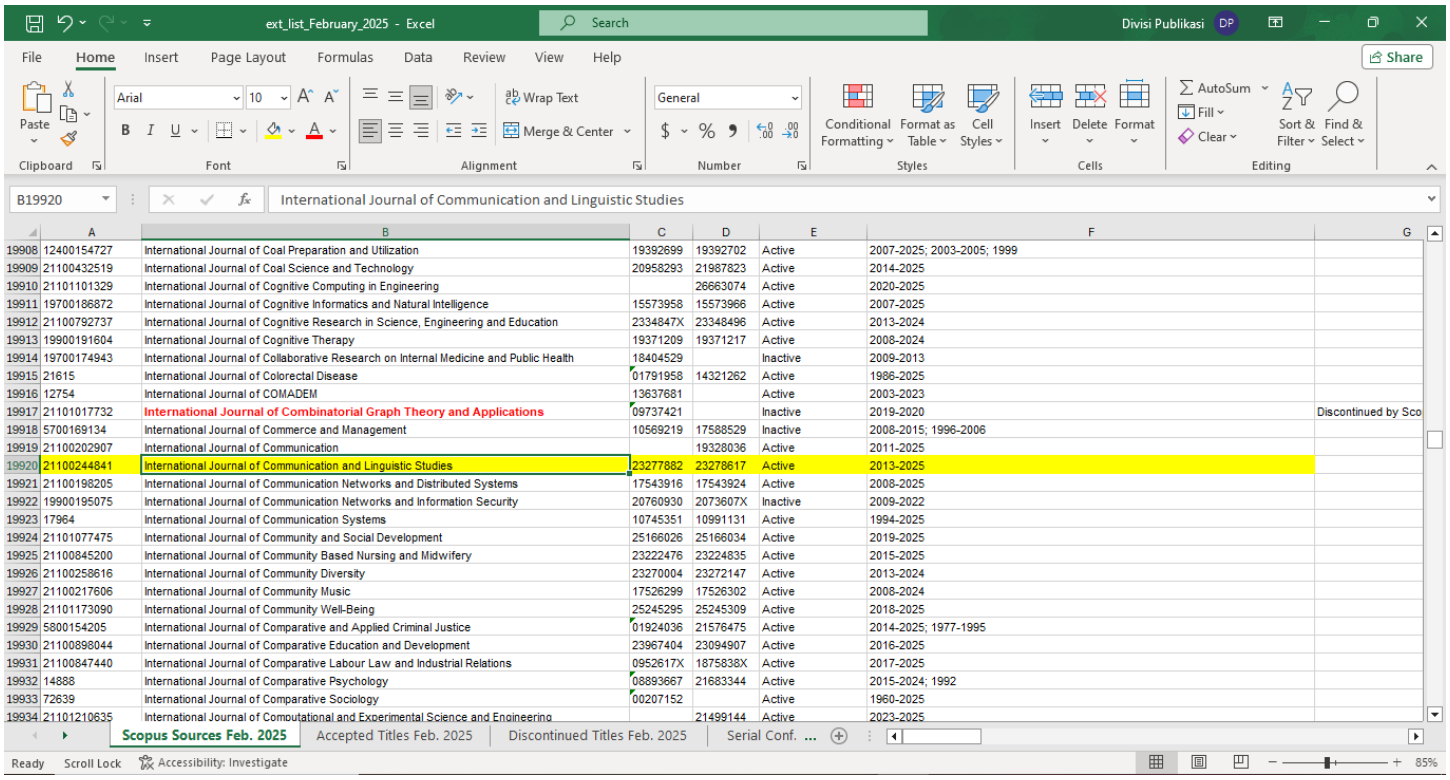

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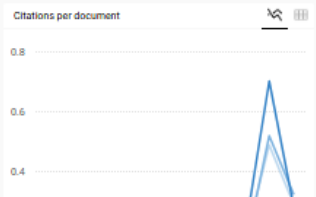

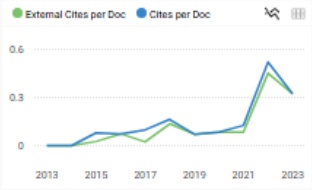

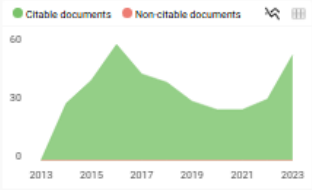

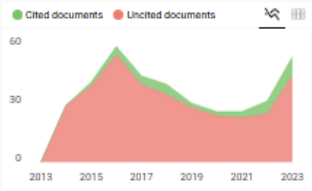

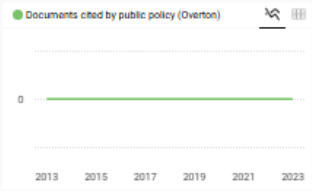

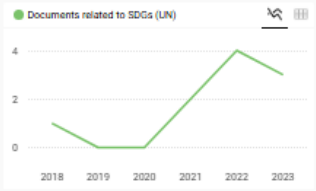

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