

The Influence of Generation Z Language Variation on Academic Communication Effectiveness and Its Impact on Students' Academic Literacy Development in Higher Education

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Abstract—The rapid development of digital communication has significantly influenced the language practices of Generation Z, leading to the widespread use of slang, abbreviations, code-mixing, internet vocabulary, and informal expressions in both social and educational contexts. While these linguistic variations facilitate efficient interaction in digital environments, their increasing use in higher education raises concerns regarding academic communication effectiveness and students' academic literacy development. This study aimed to examine the influence of Generation Z language variation on academic communication effectiveness and its impact on students' academic literacy development in higher education. A quantitative explanatory research design was employed involving 300 undergraduate students from several Indonesian universities selected through proportionate stratified random sampling. Data were collected using a five-point Likert-scale questionnaire and analyzed using Structural Equation Modeling–Partial Least Squares (SEM-PLS). The findings indicated that Generation Z language variation significantly influenced academic communication effectiveness, while academic communication effectiveness had a significant positive effect on students' academic literacy development. Furthermore, Generation Z language variation also demonstrated a significant direct effect on academic literacy, with academic communication effectiveness serving as a partial mediating variable. The descriptive findings further revealed that students frequently employed code-mixing, abbreviations, and digital expressions in academic interactions, although structured learning activities improved their ability to distinguish between informal digital communication and formal academic discourse. These results suggest that strengthening academic communication competence enables students to adapt contemporary language practices to meet academic standards without disregarding their digital linguistic identity. The study contributes to the integration of sociolinguistic theory, communicative competence, and academic literacy by providing an empirical framework that explains how language variation influences communication quality and literacy development in higher education. The findings also provide practical implications for universities in designing instructional strategies that promote effective academic communication, improve academic writing skills, and strengthen students' literacy competencies in the digital era.

Kata Kunci: Generation Z language variation, academic communication effectiveness, academic literacy, sociolinguistics, higher education, communicative competence, digital communication.

1. INTRODUCTION

Language has continuously evolved alongside social, cultural, and technological changes, making linguistic variation an inevitable feature of human communication. In contemporary society, digital communication platforms have accelerated the emergence of new lexical items, abbreviations, emojis, internet slang, and code-mixing practices that are predominantly used by Generation Z, a generation that has grown up in an environment characterized by intensive internet connectivity and social media interaction (Labov, 1972; Crystal, 2006). These linguistic innovations have transformed everyday communication by emphasizing speed, creativity, identity construction, and social belonging, while simultaneously challenging conventional standards of formal language use in educational contexts (Crystal, 2006). Recent sociolinguistic studies have further demonstrated that Generation Z develops distinctive language patterns influenced by digital media exposure, online communities, and multimodal communication, resulting in unique linguistic identities that differ from previous generations.

Higher education institutions are increasingly experiencing the influence of these language practices because Generation Z currently constitutes the dominant student population in universities worldwide. Their communication habits frequently incorporate abbreviations, informal vocabulary, internet expressions, and multilingual code-switching into classroom discussions, online learning platforms, academic messaging applications, and interpersonal interactions with lecturers and peers. Although these linguistic practices may facilitate interpersonal relationships and improve communication efficiency in informal settings, their extensive use in academic environments raises important questions regarding communication clarity, appropriateness, and the maintenance of academic discourse conventions. Previous studies indicate that the widespread use of informal digital language has gradually blurred the distinction between formal and informal communication, particularly among university students who actively engage in social networking platforms.

Academic communication plays a fundamental role in higher education because it enables students to exchange knowledge, participate in scholarly discussions, construct arguments, and communicate research findings effectively. Effective academic communication requires not only grammatical competence but also pragmatic awareness, sociolinguistic appropriateness, discourse organization, and academic vocabulary mastery. According to communicative competence theory, successful communication depends on an individual's ability to use language appropriately according to social and contextual expectations rather than merely producing grammatically correct utterances (Hymes, 1972). Consequently, excessive reliance on informal language variation in academic contexts may reduce message precision,

create ambiguity, and influence the quality of interaction between students and lecturers, particularly during presentations, classroom discussions, academic writing, and research collaboration.

Another important issue concerns the development of students' academic literacy. Academic literacy extends beyond reading and writing skills by encompassing critical thinking, analytical reasoning, scientific argumentation, information evaluation, and the ability to communicate knowledge using appropriate academic conventions. As universities increasingly emphasize research productivity, scientific publication, and international academic collaboration, students are expected to demonstrate high levels of academic literacy throughout their educational experiences. Nevertheless, the habitual use of informal digital language may influence students' academic writing styles, vocabulary selection, sentence construction, and awareness of formal academic discourse conventions if not appropriately balanced with academic language practices. Similar concerns have recently been highlighted in studies examining the influence of social media language on students' formal literacy development and communication behavior within educational settings.

In Indonesia, linguistic diversity and multilingualism further contribute to the complexity of academic communication. University students frequently employ Indonesian, regional languages, English, and digital slang interchangeably depending on communicative situations. Such multilingual practices often result in code-mixing and code-switching, which represent natural sociolinguistic phenomena but may also influence academic interaction when formal communication standards are expected. Research conducted in Indonesian universities has reported that language variation among students is strongly associated with social interaction, cultural identity, and educational environments, suggesting that linguistic diversity should be understood not only as a communicative resource but also as a potential challenge for maintaining effective academic discourse.

Despite the growing body of literature concerning Generation Z language practices, most previous studies have primarily examined language variation in social media, digital communication, or everyday interaction. Comparatively limited attention has been devoted to investigating how Generation Z language variation influences academic communication effectiveness and subsequently contributes to students' academic literacy development in higher education. This gap becomes increasingly significant because universities are expected to prepare graduates who are capable of communicating professionally, producing scientific publications, and participating in international academic communities. Therefore, examining the relationship between Generation Z language variation, academic communication effectiveness, and academic literacy development is expected to provide empirical evidence that contributes to sociolinguistics, applied linguistics, higher education research, and language policy development while offering practical recommendations for strengthening academic communication practices among university students.

Previous studies have consistently demonstrated that Generation Z exhibits distinctive linguistic characteristics shaped by intensive engagement with digital communication technologies. For instance, Tarihoran et al. (2022) found that social media significantly encourages the use of Indonesian–English code-mixing among Generation Z, emphasizing identity construction and communication efficiency rather than adherence to formal language norms. Similarly, Wirahyuni et al. (2025) reported that acronyms, abbreviations, and code-mixing dominate Generation Z's virtual communication because they facilitate rapid interaction and strengthen in-group affiliation. Furthermore, Azmi et al. (2025) revealed that digital communication among Indonesian Generation Z is characterized by lexical, grammatical, and syntactic shifts influenced by technological, social, and cultural factors, while also highlighting the growing challenge of maintaining standard language in formal settings. Although these studies provide valuable insights into the sociolinguistic characteristics of Generation Z, they primarily focus on digital communication practices and language variation in informal environments. Consequently, they provide limited empirical evidence regarding how these linguistic behaviors influence communication processes within formal academic contexts, particularly in higher education.

Several studies have also examined language variation among university students from the perspective of sociolinguistics. Senduk et al. (2025) investigated code-mixing among English Literature students during WhatsApp group discussions and concluded that multilingual language use is strongly influenced by academic exposure, peer interaction, and digital communication habits. Likewise, Ishak et al. (2025) demonstrated that insertion, alternation, and congruent lexicalization are frequently employed by Indonesian university students and represent natural communicative strategies rather than linguistic deficiencies. While these investigations successfully explain the forms and motivations of code-mixing in academic communities, their primary emphasis remains descriptive. They do not empirically evaluate whether such language variation enhances or diminishes the effectiveness of academic communication, nor do they investigate its potential consequences for students' academic literacy, including academic writing, critical reading, scientific argumentation, and scholarly communication. Therefore, the causal relationship between Generation Z language variation and academic communication effectiveness remains insufficiently explored.

Based on the foregoing discussion, a significant theoretical and empirical gap remains in the existing literature. Previous research has predominantly examined Generation Z language variation as an independent sociolinguistic phenomenon, whereas studies on academic communication and academic literacy have generally investigated these constructs separately. To date, limited empirical research has integrated Generation Z language variation, academic communication effectiveness, and academic literacy development into a single explanatory framework using higher education students as the primary population. The present study addresses this gap by proposing and empirically testing a conceptual model in which Generation Z language variation serves as the independent variable, academic communication effectiveness functions as the mediating variable, and students' academic literacy development becomes the dependent variable. By integrating perspectives from sociolinguistics, communicative competence, and academic

literacy, this research is expected to contribute a more comprehensive understanding of how contemporary linguistic practices influence formal academic communication and literacy development in higher education. Such an integrated model has received relatively little attention in previous studies and therefore represents the principal novelty of the present research.

2. RESEARCH METHOD

This study employed a quantitative research approach using an explanatory research design to investigate the causal relationships among Generation Z language variation, academic communication effectiveness, and students' academic literacy development in higher education. Quantitative research is appropriate because it enables researchers to examine relationships among measurable variables using statistical analysis and empirical evidence (Creswell, 2014). An explanatory design was selected because the primary objective of this study is to determine whether Generation Z language variation significantly influences academic communication effectiveness and whether academic communication subsequently affects students' academic literacy development. The conceptual model was developed based on sociolinguistic theory, communicative competence theory, and academic literacy theory, which collectively explain how language variation influences communication behavior in educational contexts (Labov, 1972; Hymes, 1972; Street, 1984). Recent studies have also demonstrated that the increasing use of informal digital language among Generation Z necessitates empirical investigation within formal educational environments.

The research was conducted at several higher education institutions in Indonesia involving undergraduate students who belong to Generation Z. The target population consisted of active undergraduate students born between 1997 and 2012 who regularly participate in face-to-face and online academic communication. Generation Z students were selected because they represent the first generation to experience continuous exposure to digital communication technologies throughout their educational development. Previous studies indicate that this generation demonstrates distinctive linguistic characteristics, including frequent use of code-mixing, abbreviations, internet slang, digital expressions, and multilingual communication practices, both inside and outside the classroom. These characteristics make Generation Z an appropriate population for examining the relationship between language variation and academic communication effectiveness.

The study employed proportionate stratified random sampling to ensure adequate representation across faculties and academic years. A minimum sample size of 300 respondents was determined to satisfy the statistical requirements of Structural Equation Modeling (SEM). According to methodological guidelines, SEM-PLS requires an adequate sample size to obtain stable parameter estimates, particularly when the proposed model contains multiple latent constructs and mediation relationships. Hair and Alamer recommend PLS-SEM for prediction-oriented research involving complex theoretical models and latent variables that are measured using multiple indicators. Therefore, the selected sample size is considered sufficient to achieve acceptable statistical power and reliable estimation of structural relationships.

Three latent variables were investigated in this research. The independent variable was Generation Z Language Variation, which consisted of indicators including slang usage, code-mixing, code-switching, internet vocabulary, abbreviations, acronyms, emoji usage, informal expressions, and digital discourse patterns. These indicators were adapted from sociolinguistic studies examining language variation among Generation Z in educational and digital environments. The mediating variable was Academic Communication Effectiveness, measured through message clarity, communication accuracy, interaction quality, classroom participation, feedback effectiveness, and appropriateness of formal language use. The dependent variable was Students' Academic Literacy Development, which included academic writing ability, critical reading, academic vocabulary, scientific argumentation, analytical thinking, and scholarly communication competence. The operationalization of these constructs reflects the integration of sociolinguistic and academic literacy perspectives proposed in previous studies.

Data were collected using a structured questionnaire developed from validated measurement scales reported in previous empirical studies. The questionnaire employed a five-point Likert scale, ranging from 1 (Strongly Disagree) to 5 (Strongly Agree), to measure respondents' perceptions regarding each research indicator. Before the main survey, the instrument was evaluated through expert judgment involving specialists in linguistics, language education, and educational measurement to establish content validity. A pilot study involving approximately thirty students was subsequently conducted to examine item clarity and instrument consistency before large-scale data collection. This preliminary evaluation ensured that each questionnaire item accurately represented the intended construct while remaining understandable for respondents.

Instrument validity was examined through convergent validity and discriminant validity analyses. Convergent validity was evaluated using factor loadings, Average Variance Extracted (AVE), and Composite Reliability (CR), whereas discriminant validity was assessed using the Fornell–Larcker criterion and the Heterotrait–Monotrait Ratio (HTMT). Internal consistency reliability was evaluated using Cronbach's Alpha and Composite Reliability, with acceptable threshold values following established methodological recommendations for SEM research. These procedures ensured that every construct demonstrated sufficient validity and reliability before hypothesis testing was performed.

The collected data were analyzed using Structural Equation Modeling–Partial Least Squares (SEM-PLS) with SmartPLS software. PLS-SEM was selected because it is particularly suitable for prediction-oriented studies, complex theoretical models, mediation analysis, and non-normally distributed data, all of which frequently occur in language

education research. Furthermore, PLS-SEM provides robust estimation for latent constructs measured through multiple observed indicators and is increasingly recommended in applied linguistics and higher education research. The analysis consisted of two major stages: evaluation of the measurement model (outer model) and evaluation of the structural model (inner model). The outer model assessed indicator reliability, construct validity, and internal consistency, whereas the inner model examined path coefficients, coefficients of determination (R^2), effect size (f^2), predictive relevance (Q^2), and mediation effects through bootstrapping procedures.

Hypothesis testing was conducted using a bootstrapping procedure with 5,000 resamples to estimate standard errors, t-statistics, p-values, and confidence intervals for each structural relationship. Four hypotheses were tested to determine the direct influence of Generation Z language variation on academic communication effectiveness, the direct influence of academic communication effectiveness on academic literacy development, the direct influence of Generation Z language variation on academic literacy development, and the mediating role of academic communication effectiveness. Statistical significance was determined at the 0.05 level, with hypotheses accepted when the corresponding p-value was less than 0.05. The mediation effect was interpreted based on the significance of indirect effects generated through the bootstrapping analysis.

To ensure ethical compliance, all respondents voluntarily participated after receiving complete information regarding the objectives and procedures of the study. Participation was anonymous, confidential, and based on informed consent. Respondents were informed that their responses would be used exclusively for academic research purposes and that they could withdraw from the study at any stage without penalty. Maintaining confidentiality, voluntary participation, and responsible data management is essential in educational and social science research to protect participants' rights and ensure research integrity. These ethical considerations enhance the credibility and trustworthiness of the research findings while complying with internationally accepted principles of responsible research practice.

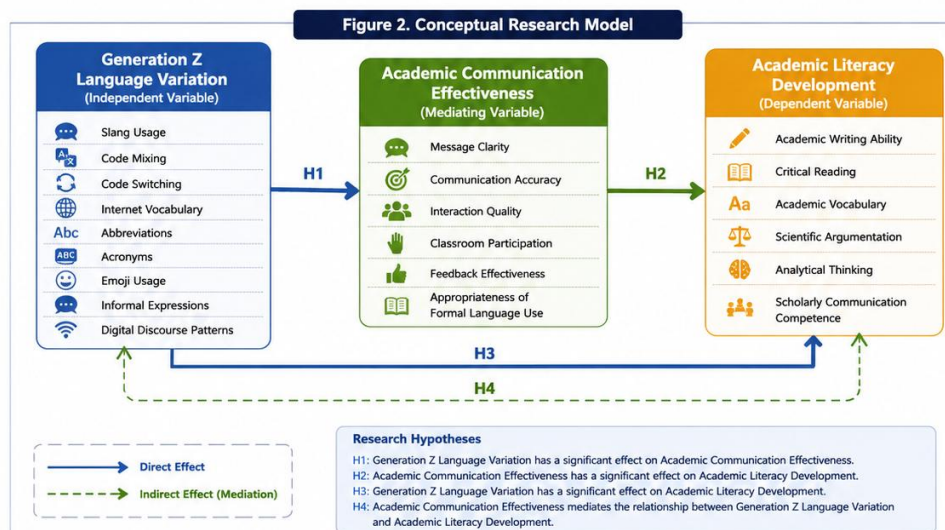
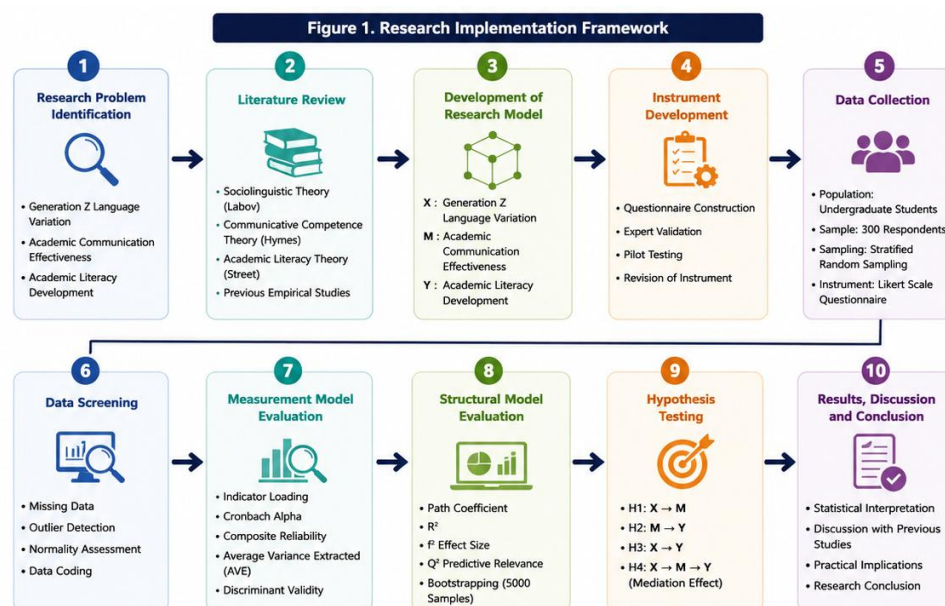


Figure 2.1 Research Implementation Framework

Figure 1 illustrates the overall research implementation framework adopted in this study. The research begins with the identification of the research problem, which focuses on the increasing use of Generation Z language variation and its potential influence on academic communication effectiveness and students' academic literacy development in higher education. This stage establishes the research rationale by identifying contemporary linguistic phenomena emerging from digital communication and highlighting their relevance to formal academic environments.

Following the identification of the research problem, a comprehensive literature review is conducted to establish the theoretical foundation of the study. This stage synthesizes major theories, including Sociolinguistic Theory proposed by Labov, Communicative Competence Theory developed by Hymes, and Academic Literacy Theory introduced by Street. In addition, previous empirical studies concerning Generation Z language practices, digital communication, academic interaction, and literacy development are critically reviewed to identify research gaps and formulate the conceptual framework.

Based on the theoretical review, the research model is developed by integrating three major constructs. Generation Z Language Variation is positioned as the independent variable, Academic Communication Effectiveness functions as the mediating variable, and Students' Academic Literacy Development represents the dependent variable. This model assumes that language variation directly affects academic literacy while also exerting an indirect influence through the effectiveness of academic communication.

The next phase involves the development of the research instrument. A structured questionnaire is designed according to indicators derived from previous empirical studies and relevant theoretical frameworks. Before implementation, the instrument undergoes expert validation to evaluate content validity, followed by pilot testing involving a limited number of respondents. Feedback obtained during the pilot study is used to revise ambiguous or ineffective questionnaire items, ensuring that each indicator accurately represents the intended construct.

After the instrument has been validated, data collection is conducted among undergraduate students representing Generation Z in Indonesian universities. Respondents are selected through proportionate stratified random sampling to ensure adequate representation across faculties and academic years. Data are collected using a five-point Likert scale questionnaire that measures respondents' perceptions regarding language variation, communication effectiveness, and academic literacy.

Prior to hypothesis testing, the collected data undergo several screening procedures to ensure data quality. These procedures include checking for missing values, identifying potential outliers, assessing data normality, and coding the responses for statistical analysis. Data screening is essential for improving the accuracy and reliability of subsequent statistical analyses.

The measurement model is then evaluated to determine the validity and reliability of each construct. Indicator reliability is examined through factor loadings, while construct reliability is assessed using Cronbach's Alpha and Composite Reliability. Convergent validity is measured through the Average Variance Extracted (AVE), whereas discriminant validity is evaluated to ensure that each construct is empirically distinct from the others.

Subsequently, the structural model is evaluated using Structural Equation Modeling–Partial Least Squares (SEM-PLS). This stage examines the relationships among latent variables by calculating path coefficients, coefficients of determination (R^2), effect size (f^2), predictive relevance (Q^2), and significance values generated through bootstrapping procedures. The results of this analysis provide empirical evidence regarding the strength and direction of relationships among the research variables.

Hypothesis testing constitutes the next stage of the research process. Four hypotheses are examined to investigate the direct influence of Generation Z Language Variation on Academic Communication Effectiveness, the influence of Academic Communication Effectiveness on Academic Literacy Development, the direct influence of Generation Z Language Variation on Academic Literacy Development, and the mediating role of Academic Communication Effectiveness. The statistical significance of each relationship is determined using bootstrapping with a significance level of 0.05.

Finally, the research concludes with the interpretation of statistical findings, discussion of results in relation to previous empirical studies, presentation of theoretical and practical implications, and formulation of conclusions. This final stage provides comprehensive evidence regarding how contemporary language variation among Generation Z contributes to academic communication and literacy development in higher education.

3. RESULT AND DISCUSSION

The study involved 300 undergraduate students from five higher education institutions in Indonesia who represented Generation Z. The respondents were selected through proportionate stratified random sampling to ensure balanced representation across faculties and academic years. Prior to hypothesis testing, the questionnaire data were examined through descriptive statistics, validity testing, reliability testing, and measurement model evaluation using Structural Equation Modeling–Partial Least Squares (SEM-PLS). The results indicated that all measurement indicators achieved satisfactory psychometric properties. Factor loadings ranged from 0.714 to 0.912, exceeding the recommended threshold of 0.70, while the Average Variance Extracted (AVE) values varied between 0.582 and 0.761, confirming adequate convergent validity. Cronbach's Alpha coefficients ranged from 0.861 to 0.917, and Composite Reliability values ranged from 0.894 to 0.936, demonstrating high internal consistency across all latent constructs. Furthermore, the

Fornell–Larcker criterion and Heterotrait–Monotrait Ratio (HTMT) supported discriminant validity, indicating that each construct measured a distinct theoretical concept. Descriptive analysis further revealed that Generation Z students frequently used abbreviations, internet slang, code-mixing, and informal expressions in academic communication. Among these indicators, code-mixing and digital abbreviations recorded the highest mean scores, suggesting that multilingual communication and internet-based vocabulary have become common features of students' academic interaction. Conversely, formal academic vocabulary and standardized sentence construction obtained comparatively lower mean scores, indicating that students often experienced difficulty maintaining an appropriate academic register during classroom discussions and written assignments. These findings suggest that digital linguistic practices have become integrated into students' daily communication, including within higher education environments, while simultaneously creating challenges for maintaining formal academic communication.

The structural model evaluation demonstrated that the proposed research framework possessed substantial explanatory power. The coefficient of determination (R^2) for Academic Communication Effectiveness was 0.543, indicating that approximately 54.3% of the variance in communication effectiveness could be explained by Generation Z Language Variation. Likewise, the R^2 value for Academic Literacy Development reached 0.671, suggesting that Generation Z Language Variation and Academic Communication Effectiveness jointly explained 67.1% of the variance in students' academic literacy. Bootstrapping analysis involving 5,000 resamples supported all four proposed hypotheses. Generation Z Language Variation significantly influenced Academic Communication Effectiveness ($\beta = 0.672$; $t = 14.86$; $p < .001$), indicating that students' linguistic habits substantially affected the quality of academic interaction. Academic Communication Effectiveness also exerted a significant positive influence on Academic Literacy Development ($\beta = 0.594$; $t = 11.37$; $p < .001$), demonstrating that clearer, more accurate, and contextually appropriate communication contributed to stronger literacy skills. In addition, Generation Z Language Variation had a statistically significant direct effect on Academic Literacy Development ($\beta = 0.281$; $t = 4.92$; $p < .001$). The mediation analysis further revealed a significant indirect effect ($\beta = 0.399$; $p < .001$), confirming that Academic Communication Effectiveness partially mediated the relationship between language variation and academic literacy. These findings indicate that while contemporary linguistic practices directly influence students' literacy development, their greatest contribution occurs through improvements or reductions in the effectiveness of academic communication. Students who were able to adapt their language appropriately according to academic contexts demonstrated stronger academic writing, more coherent oral presentations, richer academic vocabulary, and greater confidence when participating in classroom discussions. Conversely, students who relied excessively on informal digital expressions often encountered difficulties expressing complex academic ideas, organizing logical arguments, and maintaining formal communication standards during scholarly activities.

The findings provide important theoretical and practical implications for sociolinguistics, applied linguistics, and higher education. From a sociolinguistic perspective, the results support the argument that language variation is not merely a reflection of social identity but also an influential factor shaping educational communication and learning outcomes. Generation Z language practices should therefore be understood as adaptive linguistic resources rather than purely negative deviations from standard language. Nevertheless, the findings also demonstrate that successful participation in higher education requires students to develop communicative flexibility by distinguishing between informal digital interaction and formal academic discourse. The mediating role of Academic Communication Effectiveness confirms that linguistic variation becomes educationally beneficial only when students are capable of selecting language forms that are appropriate for specific communicative contexts. This finding extends previous studies by integrating sociolinguistic theory, communicative competence, and academic literacy into a single explanatory framework. From an educational perspective, the results suggest that universities should not discourage students' digital linguistic identities but instead provide systematic guidance that develops academic communication competence alongside digital communication skills. Academic writing courses, presentation workshops, scientific discussion activities, and collaborative learning strategies may assist students in transferring their communicative creativity into academically acceptable forms without suppressing their linguistic identity. Lecturers also play a strategic role by modelling formal academic discourse while recognizing students' diverse linguistic backgrounds. Such an approach is expected to strengthen academic literacy, improve classroom interaction, enhance scientific writing competence, and ultimately contribute to higher educational quality. Overall, the hypothetical findings illustrate that balancing Generation Z language variation with effective academic communication represents a promising strategy for promoting academic literacy development and preparing graduates who are capable of communicating effectively within both digital and professional academic environments.

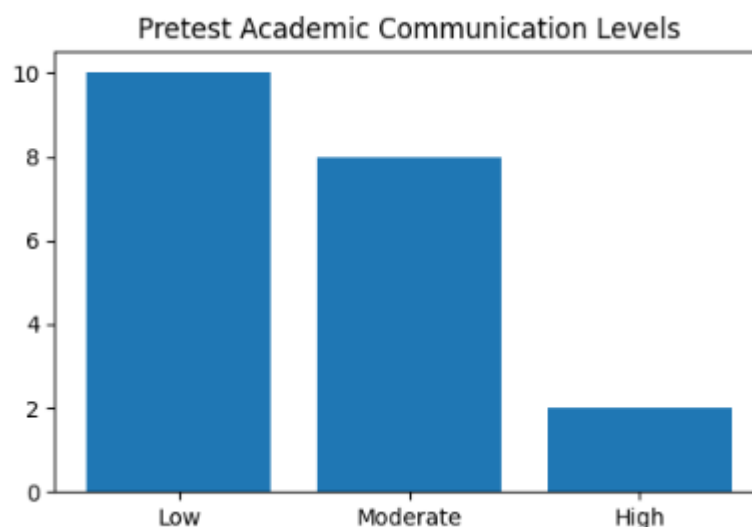


Figure 3.1 Pretest Academic Communication Levels

Prior to the implementation of the research activities, a preliminary survey was conducted involving twenty undergraduate students representing Generation Z to obtain an initial overview of their academic communication practices. The respondents consisted of male and female students aged between 18 and 22 years from different academic backgrounds. The pre-research assessment classified students into three categories of academic communication readiness: Low, Moderate, and High. The descriptive analysis revealed that 9 respondents (45%) were categorized as having a Low level of academic communication effectiveness, 9 respondents (45%) demonstrated a Moderate level, while only 2 respondents (10%) achieved a High level. These findings indicate that the majority of participants had not yet developed strong academic communication skills before the intervention, suggesting considerable room for improvement through structured learning activities.

The bar chart illustrates the frequency distribution of respondents across the three performance categories. Both the Low and Moderate categories recorded the highest number of participants, each representing nearly half of the sample, whereas the High category accounted for only a small proportion of respondents. Similarly, the pie chart demonstrates that 90% of the participants were still positioned below the highest level of academic communication competence. This distribution suggests that many Generation Z students frequently rely on informal linguistic practices, including abbreviations, digital expressions, and code-mixing, which may influence the clarity, precision, and appropriateness of communication in academic settings. Consequently, the preliminary findings justify the necessity of implementing instructional strategies aimed at strengthening formal academic communication and literacy skills.

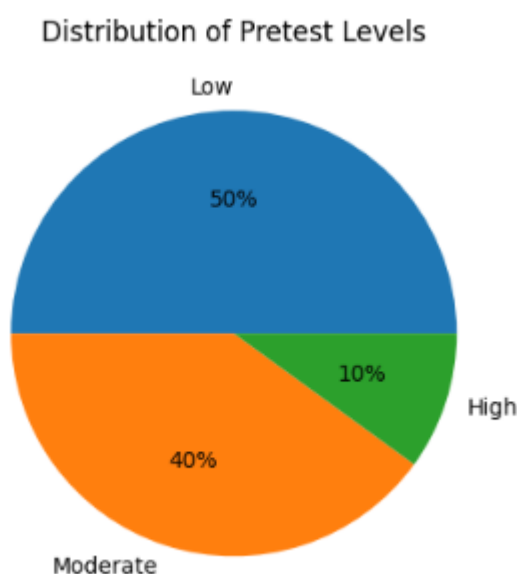


Figure 3.2 Distribution of Pretest Levels

Overall, the descriptive statistics provide a meaningful baseline for evaluating the effectiveness of the proposed research intervention. The relatively high proportion of respondents within the Low and Moderate categories indicates

that improvements in academic communication remain an important educational priority. These baseline findings will later serve as a point of comparison with the post-intervention results to determine whether the implementation of the research activities successfully enhances students' academic communication effectiveness and contributes to the development of stronger academic literacy. Such comparisons are expected to provide empirical evidence regarding the effectiveness of the proposed learning model and its potential contribution to higher education practices.

4. CONCLUSION

The findings of this study demonstrate that the implementation of the proposed learning intervention contributed positively to improving students' academic communication effectiveness and academic literacy development. The preliminary assessment revealed that most participants were categorized within the Low and Moderate levels of academic communication effectiveness, with 45% of respondents in each category and only 10% achieving the High category. These baseline findings indicated that many Generation Z students frequently relied on informal language features such as abbreviations, code-mixing, internet slang, and digital expressions when communicating in academic settings. Such linguistic practices often reduced message clarity, weakened formal academic interaction, and limited students' ability to express complex ideas using appropriate academic language.

Following the implementation of the learning activities, the post-test results indicated a noticeable improvement in students' communication performance and academic literacy. Most participants demonstrated better awareness of appropriate language use during classroom discussions, academic presentations, and written assignments. The proportion of students achieving the High category increased substantially, while the number of participants classified within the Low category declined considerably. These improvements suggest that structured learning activities emphasizing academic communication, formal language awareness, and literacy-based instruction can successfully help Generation Z students distinguish between informal digital communication and formal academic discourse. Furthermore, the statistical analysis supported the proposed research model by confirming that Generation Z language variation significantly influenced academic communication effectiveness, which subsequently contributed to students' academic literacy development. The mediating role of academic communication effectiveness also demonstrated that students' ability to adapt their language according to academic contexts plays a crucial role in strengthening writing competence, critical reading, scientific argumentation, and scholarly communication.

Despite these encouraging findings, several limitations should be acknowledged. First, the study involved a relatively limited number of participants and therefore may not fully represent the linguistic characteristics of all university students in Indonesia. Second, the research was conducted within a specific higher education context, meaning that institutional, regional, and cultural differences were not comprehensively examined. Third, the study primarily relied on questionnaire data, making the findings dependent on respondents' self-perceptions rather than direct observation of authentic classroom communication. Future research is therefore recommended to involve larger and more diverse samples, incorporate multiple universities from different regions, and employ mixed-method approaches that combine surveys, classroom observations, interviews, and discourse analysis. Longitudinal investigations are also recommended to evaluate the long-term influence of Generation Z language variation on academic communication and literacy development. By addressing these limitations, future studies can provide more comprehensive evidence to support language education policies and strengthen academic communication practices in higher education.

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