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ARTICLE

Unraveling the Predictive Roles of Grammar Mastery, Logical Ability, and Schemata Toward University Students' Reading Comprehension in Indonesian Language

Siti Samhati [1*] ***, Muhammad Nurwahidin*** [2] ***, Edi Suyanto*** [1] ***, Mulyanto Widodo*** [1] ***, Nadya Amalia Nasoetion*** [3] ***, Vito Frasetya*** [4]

[1] *Department of Language Education in Indonesia, University of Lampung, Bandar Lampung 35145, Indonesia*

[2] *Department of Educational Technology, University of Lampung, Bandar Lampung 35145, Indonesia*

[3] *Department of Islamic Communication and Broadcasting, UIN Raden Intan, Bandar Lampung 35145, Indonesia*

[4] *Department of Communication Science, University of Lampung, Bandar Lampung 35145, Indonesia*

ABSTRACT

Reading comprehension in Indonesian language is essential for academic success, yet many university students struggle due to limited grammar mastery, logical ability, and schemata (prior knowledge). Previous studies have examined these factors separately, but their combined predictive power has relatively remained unexplored. The purpose of this study is to examine grammar mastery, logical ability, and schemata as the predictors of university students' reading comprehension in the Indonesian language. Using a non-experimental survey design with a quantitative approach, data were collected from 600 students at a public university in Bandar Lampung, Indonesia, selected through cluster random sampling. Four validated and reliable multiple-choice tests were used to measure grammar mastery, logical ability, schemata, and reading comprehension. Data were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM) with SmartPLS v.4. Results showed that grammar mastery ($\beta = 0.365$, $p < 0.001$), logical ability ($\beta = 0.330$, $p < 0.001$), and schemata ($\beta = 0.274$, $p = 0.001$) each significantly predicted reading comprehension, accounting for 78% of its variance. Moderate effect

*CORRESPONDING AUTHOR:

Siti Samhati, Department of Language Education in Indonesia, University of Lampung, Bandar Lampung 35145, Indonesia;
Email: siti.samhati@fkip.unila.ac.id

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sizes were found for grammar mastery and logical ability, and a smaller but significant effect for schemata. The findings confirm that reading comprehension is a multi-component skill requiring linguistic, cognitive, and experiential knowledge. Implications include integrating grammar, reasoning, and prior knowledge development into reading instruction to improve university students' academic literacy in the Indonesian language.

Keywords: Grammar Mastery; Logical Ability; Schemata; Reading Comprehension; Indonesian Language; University Students

1. Introduction

The Reading comprehension in the Indonesian language is fundamental for university students because it underpins academic success across disciplines. Mastery of reading comprehension enables critical engagement with texts in law, social sciences, humanities, and STEM courses alike[1]. In higher education, students must synthesize complex ideas from articles, monographs, and research reports. Without solid reading skills, they struggle to obtain meaning, critique arguments, or construct their own academic responses. Furthermore, reading comprehension supports self-directed learning and fosters independent research capacities[2]. Proficiency in Indonesian reading is also vital for professional communication and life-long learning in the Indonesian context. Yet many students reach university with weak foundations in this area, which leads to inefficiencies in time and resources[3]. Recognizing reading comprehension as an academic keystone motivates interventions and pedagogical reform in Indonesian higher education. It also justifies research into cognitive and linguistic predictors of reading outcomes. Therefore, understanding what drives or hinders comprehension is crucial for enhancing educational quality in Indonesia.

Despite its importance, many Indonesian university students exhibit poor reading comprehension in their native language. Empirical studies have consistently shown below-expected performance. For example, a study by Budianto et al.[4] found that over 60 % of students scored below the minimal threshold on standardized reading tests. Another investigation by Miqawati and Sulistyo[5] reported weak comprehension in summarizing and inferential tasks among freshmen. A qualitative study by Sari et al.[6] highlighted widespread difficulty in understanding argument structure in academic texts. Factors commonly linked to poor reading comprehension include insufficient grammar mastery, weak logical reasoning, and limited schemata. Grammar mastery refers to knowledge of syntax, morphology, and sentence structure. Logical ability encompasses skills such as drawing inferences, recognizing arguments, and following deductive chains. Schemata represent background knowledge and mental frameworks for interpreting text[7,8]. When students lack a strong command of these three factors, text processing and meaning-making suffer. The problem this study addresses is how grammar mastery, logical ability, and schemata together explain poor reading comprehension among Indonesian university students. Grammar mastery and reading comprehension in Indonesian are closely intertwined. Understanding grammar enables readers to parse sentence structures and relationships among clauses[9]. For instance, knowing conjunctions, passive voice, and relative clauses clarifies how ideas are organized. Without grammar mastery, readers may misinterpret subject-verb agreement or tense markers, leading to confusion. Grammar knowledge also supports resolving ambiguity in complex sentences[10]. When students recognize grammatical patterns, they decode meaning efficiently and read more fluently. This fluency frees cognitive resources to focus on overall comprehension rather than mechanical decoding. As a result, grammar mastery can serve as a predictor of reading comprehension performance. Students with stronger grammar skills are more likely to infer meaning accurately and integrate ideas coherently[11]. Grammar therefore provides a foundation for higher-order comprehension tasks. In sum, grammar mastery undergirds effective understanding of Indonesian texts at the university level.

Logical ability also plays a significant role in reading comprehension in Indonesian. Logical thinking allows readers to connect statements, detect contradictions, and follow argument development[12]. For example, when reading an argumentative essay, students must identify

premises, conclusions, and supporting evidence. Logical ability aids in drawing valid inferences and recognizing implicit meaning. Without this cognitive skill, readers may miss the relationships between ideas or accept invalid reasoning. Moreover, logical ability supports critical evaluation of text and helps readers distinguish fact from opinion. It also enables readers to structure their own understanding in a coherent mental framework. Students with well-developed logical skills can summarize, compare, and analyze text more effectively [13]. Thus, logical ability can predict reading comprehension success by enabling deeper processing of complex texts. Ultimately, logical reasoning enhances both literal and inferential comprehension in academic reading.

Schemata, or background knowledge structures, are also crucial for reading comprehension in the Indonesian language. When readers activate relevant schemata, they can anticipate content and interpret meaning efficiently [14]. For instance, familiarity with cultural, historical, or topical context helps in grasping implied meaning. If readers lack appropriate schemata, they struggle to fill in gaps or generate coherent inferences. Schemata support vocabulary recognition, thematic association, and integration of new information. Furthermore, schemata help readers build mental models of text organization and flow. Students with richer schemata can infer unstated relationships and detect authorial intent. In university settings, diverse subject matter demands broad schemata across disciplines [15]. Therefore, schemata predict reading comprehension: better-informed students more easily map new information onto existing frameworks. In Indonesian reading contexts, this makes schemata a strong predictor of comprehension success.

Several previous studies have examined the roles of grammar mastery, logical ability, or schemata in reading comprehension in Indonesian contexts. A number of previous studies found a significant correlation between grammar test scores and reading comprehension among literature students [9,16]. Other empirical studies, meanwhile, reported that students' logical reasoning scores predicted performance on inference questions in standard reading tests [8,17,18]. Moreover, several relevant studies showed that schemata activation exercises significantly improved reading comprehension among education students [19,20]. Most studies, however, have focused on only one predictor at a time, rarely investigating their combined influence. There is a gap in research jointly examining grammar mastery, logical ability, and schemata as interacting predictors. Additionally, previous studies often used limited samples or specific majors, reducing generalizability. This study is novel because it integrates all three predictors into a single model and uses a diverse cross-major university sample. By simultaneously examining grammar, logic, and schemata, it aims to clarify their relative contributions and interactions. These insights go beyond what earlier single-factor studies reported and advance understanding of reading comprehension predictors in Indonesian.

The purpose of this study is to investigate and examine the roles of grammar mastery, logical ability, and schemata in predicting reading comprehension in the Indonesian language among university students. Specifically, this research will measure each predictor and analyze their independent and combined contributions to comprehension outcomes. It will also explore whether interactions among them strengthen prediction. The goal is to identify which factors most strongly influence reading performance in this context. Furthermore, the study seeks to offer a clearer understanding of how these cognitive and linguistic components work together. Its significant contribution lies in informing Indonesian language instruction at the tertiary level. Teachers and curriculum designers can use these findings to target grammar, logical reasoning, and background knowledge more effectively. This can lead to pedagogical strategies that integrate grammar drills, logic exercises, and schema building. Ultimately, the study aims to enhance reading comprehension and academic success for university students. By filling a research gap and offering practical recommendations, it hopes to support the Indonesian education community and policymakers in strengthening higher education literacy programs. The following research questions are formulated to achieve the purpose of this study, namely: (1) Can grammar mastery significantly predict university students' reading comprehension in the Indonesian language? (2) Can logical ability significantly predict university students' reading comprehension in the Indonesian language? (3) Can schemata significantly predict university students' reading comprehension in the Indonesian language? Can grammar mastery, logical ability, and schemata simultaneously and significantly predict university students' reading comprehension in Indonesia lan-

guage?

2. Literature Review

2.1. Reading Comprehension in Indonesia Language

Reading comprehension is generally defined as the process of constructing meaning from written text through the interaction between the reader and the text. Choi et al. [3] describe it as an active process in which readers use their prior knowledge to interpret new information from the text. Goncalves et al. [21] emphasize that reading comprehension involves extracting and simultaneously constructing meaning through engagement with written language. According to Ma and Zhao [22], comprehension requires both decoding skills and higher-level linguistic and cognitive processes to interpret and integrate ideas. Synthesizing these perspectives, reading comprehension can be understood as a complex, interactive activity involving decoding, understanding, interpreting, evaluating, and integrating text. It is not merely recognizing words but making sense of them in context, drawing on linguistic knowledge, reasoning, and prior experiences. In the Indonesian language context, comprehension also depends on mastery of its specific grammar, vocabulary, and discourse conventions. The Indonesian writing system's structure, morphology, and syntax influence how readers process meaning. Therefore, reading comprehension in Indonesian involves both universal reading processes and the particular linguistic characteristics of the language. This synthesis underscores the importance of studying reading comprehension with a focus on Indonesian's unique linguistic and cultural dimensions.

Reading comprehension can be analyzed through several core components, including the lateral aspect, interpretative aspect, evaluative aspect, and appreciative aspect [23]. The lateral aspect focuses on the ability to understand the surface meaning of a text and recall explicit information. The interpretative aspect involves deeper processing, such as inferring unstated meaning and connecting ideas. The evaluative aspect requires critical judgment about the quality, credibility, and value of the text. The appreciative aspect relates to recognizing the aesthetic, emotional, or moral qualities of the reading material. Together, these four aspects capture both lower-order and higher-order comprehension skills. They ensure that reading is not only a mechanical decoding activity but also an intellectual and affective engagement [24]. In Indonesian reading instruction, these aspects can guide assessment and pedagogy, ensuring balanced development of literal, inferential, critical, and appreciative skills. Mastery of all four aspects leads to comprehensive reading ability that supports academic and personal literacy goals [25]. Each aspect is interconnected, meaning that strong performance in one can enhance others.

The lateral aspect of reading comprehension consists of two main skills. First, it requires the ability to remember and recognize what is written in the reading, which involves accurately recalling words, phrases, and sentences. This skill ensures that readers can identify the factual content without distortion. Second, it involves explaining information that is stated explicitly in the reading, requiring clear understanding of the surface meaning [23]. The interpretative aspect, in contrast, engages with implicit content and deeper meaning. It includes explaining information that is stated implicitly, such as identifying underlying themes or unstated relationships. It also requires making conclusions based on the reading material, which demands logical inference. Another skill within this aspect is analyzing some information obtained from reading materials, breaking it into parts and examining relationships. Finally, the interpretative aspect includes synthesizing and organizing information obtained from reading materials to form a coherent understanding [26]. These lateral and interpretative skills together form the foundation for accurate and insightful comprehension in Indonesian reading contexts.

The evaluative aspect of reading comprehension centers on the reader's ability to assess the material that has been read. This involves making judgments about the text's accuracy, logic, relevance, and credibility based on evidence and reasoning. Evaluative reading enables students to identify bias, detect faulty reasoning, and weigh the strength of arguments. It also involves considering whether the text meets its intended purpose and serves the reader's needs [23]. The appreciative aspect, on the other hand, relates to valuing and enjoying the text beyond its informational content. It includes recognizing the author's style, language choices, and creativity. Appreciative reading may involve emotional responses, aesthetic enjoyment, or moral reflection. This

aspect fosters a deeper connection between reader and text, enhancing motivation to read. In Indonesian language learning, encouraging both evaluative and appreciative reading helps cultivate critical thinkers who also value literary and cultural expression[27]. Together, these aspects complete the full spectrum of reading comprehension skills necessary for academic and cultural literacy.

2.2. Grammar Mastery

Grammar mastery refers to the comprehensive understanding and correct application of the rules that govern the structure of a language. Murtisari et al.[9] define grammar as the system of rules that describes how words and morphemes are combined to form sentences. Hasibuan et al.[28] view grammar mastery as not only knowing grammatical rules but also being able to apply them accurately in communication. Hjetland et al.[29] emphasize that grammar knowledge involves both form and function, allowing language users to construct meaning effectively. From these perspectives, grammar mastery includes knowledge of linguistic units, structural patterns, and their communicative purposes. Synthesizing these definitions, grammar mastery can be understood as the ability to accurately recognize, construct, and use linguistic forms in accordance with the rules of a specific language. In the Indonesian language context, this includes knowledge of morphology, phrase structure, clause formation, and sentence construction based on Indonesian grammar norms. Mastery of Indonesian grammar also requires sensitivity to word order, affixation, and particle use, which are distinctive in the language. Without this mastery, communication in Indonesian becomes prone to ambiguity and misunderstanding. Thus, grammar mastery is a cornerstone of both spoken and written proficiency in Indonesian.

The main components of grammar mastery can be grouped into four categories: morphology, phrases, clauses, and sentences[30]. Morphology concerns the internal structure of words, including their forms and variations. It involves understanding how root words and affixes combine to create meaning. The phrase component relates to groups of words that function together as a single unit but do not form a complete thought. Clause mastery involves recognizing and constructing groups of words that contain a subject and predicate, forming the basic building blocks of sentences. The sentence component encompasses complete thoughts, combining clauses in accordance with grammatical rules[31]. These four components are interrelated, with each forming a higher level of structure from the preceding one. In Indonesian, morphology is highly productive due to extensive affixation, which affects phrase and clause formation. The correct mastery of these components ensures both grammatical accuracy and clarity of meaning. Therefore, understanding each component is essential for comprehensive grammar mastery.

Morphology in grammar mastery consists of two main elements: original word form and derived word form. The original word form, or root, is the base unit of meaning from which other forms are derived. In Indonesian, roots can stand alone or serve as the foundation for affixed forms. Derived word forms are created through affixation, reduplication, or compounding, enabling precise expression of concepts. Mastery of morphology ensures correct word choice and grammatical agreement[32]. The phrase component, meanwhile, refers to a group of words that form a grammatical unit but do not express a complete idea. A phrase is characterized by the absence of a subject–predicate relationship, distinguishing it from a clause. Indonesian phrases may be nominal, verbal, adjectival, adverbial, or prepositional, each with distinct structural and functional roles. Understanding phrase types allows speakers to construct complex and varied expressions while maintaining grammatical accuracy[33]. Thus, mastery of morphology and phrase structure is essential for building larger grammatical units in Indonesian.

A clause is defined as a group of words containing at least a subject and a predicate, which may or may not stand alone as a complete sentence. Clauses are characterized by the presence of a finite verb and a syntactic structure that can express an idea. In Indonesian, clauses can be independent (main) or dependent (subordinate), each serving different functions in sentence construction. Mastery of clauses allows for accurate combination of ideas and logical sentence flow[11]. The sentence, in turn, is the highest grammatical unit that expresses a complete thought. A sentence in Indonesian must contain at least one clause and follow proper syntactic and semantic rules. Sentences can be classified as simple, compound, complex, or compound–complex, depending on the number and type of clauses they contain. Understanding

sentence types is crucial for organizing ideas effectively in communication. Accurate sentence construction ensures clarity, coherence, and stylistic appropriateness [34]. Mastery of clauses and sentences thus completes the hierarchy of grammar knowledge needed for effective Indonesian language use.

2.3. Logical Ability

Logical ability is generally understood as the capacity to think systematically, evaluate relationships among ideas, and draw valid conclusions. Marchis [12] defines it as the cognitive skill that enables individuals to process information, identify patterns, and apply reasoning principles to solve problems. Choi et al. [3] emphasize that logical ability is the cornerstone of critical thinking, involving both the analysis and evaluation of arguments. Cho et al. [35] describe it as purposeful, reasoned, and goal-directed thinking that operates within recognized logical frameworks. Synthesizing these perspectives, logical ability can be viewed as the mental competence to apply valid reasoning patterns in evaluating statements and reaching justified conclusions. This includes recognizing sound reasoning, detecting fallacies, and systematically testing the validity of claims. In the Indonesian language context, logical ability plays a crucial role in interpreting texts, constructing coherent arguments, and avoiding misinterpretations. Indonesian academic writing and reading tasks often require applying logical principles to support claims and assess evidence. Weak logical ability can lead to flawed interpretations, faulty arguments, and poor decision-making in academic settings. Therefore, logical ability is a key cognitive skill for academic success in Indonesian higher education.

Logical ability comprises two main components: inductive thinking and deductive thinking [36]. Inductive thinking involves reasoning from specific observations to form general conclusions, often used to identify patterns or formulate hypotheses. It is empirical in nature, relying on evidence from particular cases to support broader claims. Deductive thinking, on the other hand, begins with general principles and applies them to specific cases to test or confirm conclusions [37]. Deduction ensures that conclusions necessarily follow from the premises if the reasoning is valid. Both inductive and deductive thinking are essential in academic work, as they complement each other in problem-solving and argument construction. In Indonesian academic contexts, inductive reasoning is often used in research to develop theories from observed data. Deductive reasoning is applied to test hypotheses, verify arguments, and evaluate consistency in discourse [38]. Mastery of both forms of thinking enhances the accuracy and reliability of reasoning. Together, these components form the foundation of strong logical ability in reading, writing, and discourse analysis.

Inductive thinking includes several subcomponents that define its application and limitations. Generalization refers to forming a broad conclusion based on a set of specific observations; when done properly, it can produce valid hypotheses. Analogy involves comparing two situations to draw conclusions about their similarity in other aspects, which can guide problem-solving. Causal relationship reasoning identifies cause-and-effect links between events or phenomena, supporting explanatory arguments [39]. However, inductive reasoning can also lead to errors. Wrong generalization occurs when conclusions are drawn from insufficient or unrepresentative evidence. Lame analogy refers to a flawed comparison between two cases that lack relevant similarities. Error in causal relationship happens when causation is incorrectly inferred from mere correlation or coincidental events [40]. In Indonesian language use, these inductive errors can lead to misinterpretation of texts, weak arguments, or invalid research findings. Thus, understanding both the strengths and pitfalls of inductive reasoning is vital for developing sound logical ability in Indonesian academic contexts.

Deductive thinking also has specific subcomponents that guide its application. Categorical syllogism involves reasoning in which a conclusion follows from two categorical premises, such as “All students study; Andi is a student; therefore, Andi studies.” Negative syllogism denies a conclusion based on the logical negation of a premise. Hypothetical syllogism uses “if–then” statements to draw conclusions, linking conditional propositions logically. Alternative syllogism presents a choice between alternatives, eliminating one to affirm the other. Enthymeme is a shortened syllogism in which one premise is implied rather than explicitly stated, often used in persuasive speech and writing [41]. In Indonesian academic discourse, these deductive patterns are used in essay arguments, debate structures, and

research analysis. Misuse of these reasoning forms can lead to invalid conclusions even if the premises seem reasonable. Mastery of deductive thinking ensures that conclusions are logically inevitable when premises are true[22]. Together with inductive reasoning, it forms a complete logical toolkit for academic communication. This makes deductive thinking an indispensable part of logical ability in Indonesian higher education.

2.4. Schemata

Schemata in the context of reading comprehension refer to the mental frameworks or structures of knowledge that help readers interpret and understand texts. Amerstorfer and von Musnter-Kistner[42] define schemata as organized packets of information stored in the mind, which guide the process of interpreting new information. Garwood et al.[24] emphasize that schemata are activated when reading, enabling readers to relate prior knowledge to the material at hand. In Indonesian language learning, schemata provide a foundation for understanding both linguistic elements and cultural contexts embedded in texts. For example, a reader's familiarity with Indonesian idioms, historical events, or social norms can enhance their ability to grasp implied meanings. Synthesizing these expert views, schemata can be understood as a combination of prior experiences, conceptual frameworks, and contextual knowledge that shape comprehension. This synthesis underscores that reading is not a passive decoding of words but an active process of matching text with existing mental structures. In Indonesian academic contexts, schemata help students navigate various genres, from narrative to expository texts, by supplying background relevance. Without sufficient schemata, comprehension becomes fragmented and superficial, as the reader lacks the necessary connections to interpret meaning[19]. Therefore, developing rich schemata is crucial for achieving deep comprehension in Indonesian language learning.

Schemata in Indonesian language can be analyzed through three key components: educational foundation, educational psychology, and educational evaluation[14]. The educational foundation refers to the knowledge and principles that underlie formal learning, such as familiarity with the Indonesian curriculum, literacy standards, and subject matter content. This foundation equips students with the baseline understanding necessary to approach new texts confidently[43]. Educational psychology relates to how cognitive processes—such as memory, attention, and reasoning—interact with schemata during reading. It explains how learners store, retrieve, and connect information in Indonesian language contexts[44,45]. Educational evaluation involves assessing the extent to which a learner's schemata contribute to comprehension, critical thinking, and application of knowledge. Through evaluation, teachers can identify gaps in prior knowledge and design interventions to strengthen schemata[46]. In Indonesian classrooms, these three components work together: foundational knowledge supplies content, psychological processes enable integration, and evaluation ensures progress. Together, they create a comprehensive framework for understanding and enhancing schemata in reading comprehension. Strengthening all three components helps learners engage with Indonesian texts at a higher cognitive and interpretive level.

3. Theoretical Model and Hypothesis

Grammar mastery has a direct and significant relationship with reading comprehension in the Indonesian language[9]. Mastery of grammar enables students to decode sentence structures, understand word relationships, and interpret complex clauses accurately. Indonesian texts often use varied syntactic constructions, such as passive voice, relative clauses, and affixation, which require grammatical competence to interpret. Without grammar mastery, readers may misidentify subjects, predicates, or modifiers, leading to misunderstanding. Strong grammar knowledge also allows students to process information more fluently, freeing cognitive resources for higher-order comprehension tasks. By understanding grammatical cues, readers can better identify main ideas, supporting details, and logical connections between sentences. This ability improves both literal and inferential comprehension[19]. Grammar mastery also supports vocabulary understanding, as many Indonesian words change meaning through affixes, which are part of morphological grammar rules. When grammar knowledge is lacking, comprehension breaks down even if vocabulary knowledge is adequate[47]. Therefore, grammar mastery can reliably predict university students' reading comprehension in Indonesian, as it forms the foundation for decoding and interpreting

textual meaning.

H1. *Grammar mastery can significantly predicts university students' reading comprehension in the Indonesian language.*

Logical ability also plays a crucial role in predicting reading comprehension in the Indonesian language. This cognitive skill allows readers to connect ideas, recognize patterns, and evaluate the logical flow of arguments in a text. Indonesian academic reading often involves analyzing cause-and-effect relationships, identifying premises and conclusions, and distinguishing between valid and flawed reasoning. Without strong logical ability, students may misunderstand argumentative structures or accept weak claims as valid. Logical ability supports the comprehension of implicit meanings, as readers use reasoning to fill gaps between stated facts[4]. It also aids in synthesizing information from multiple parts of the text into a coherent understanding. When logical skills are applied effectively, readers can detect inconsistencies, contradictions, or unsupported statements in a passage. These skills not only improve comprehension accuracy but also enhance critical engagement with the material. Since logical ability determines how well readers can analyze and integrate information, it becomes a strong predictor of reading comprehension outcomes[7]. In the Indonesian university context, logical reasoning is essential for mastering academic reading tasks across disciplines.

H2. *Logical ability can significantly predicts university students' reading comprehension in the Indonesian language.*

Schemata, or prior knowledge structures, significantly influence reading comprehension in the Indonesian language[17]. Readers rely on schemata to interpret new information by connecting it to what they already know. In the Indonesian language, cultural, historical, and topical knowledge helps readers understand references, idioms, and implicit meanings within a text. Without relevant schemata, readers may fail to grasp the deeper significance of passages, even if the vocabulary and grammar are understood[47]. Schemata also guide readers in predicting content, anticipating arguments, and filling in missing information. When reading academic texts, background knowledge about the subject matter allows students to integrate new ideas into existing frameworks more efficiently. This process makes comprehension faster and more accurate. In Indonesian university settings, students with well-developed schemata across disciplines have an advantage in understanding diverse reading materials. Limited schemata often lead to fragmented comprehension and superficial interpretation[8]. Thus, schemata can serve as a powerful predictor of reading comprehension in the Indonesian language.

H3. *Schemata significantly predict university students' reading comprehension in Indonesian language.*

Grammar mastery, logical ability, and schemata collectively provide a comprehensive prediction of reading comprehension in Indonesian. Grammar mastery ensures that readers can accurately decode and interpret sentence structures, logical ability enables them to connect and evaluate ideas, and schemata provide the contextual background needed for deeper understanding[7,9,17]. These three factors interact dynamically during the reading process. For example, grammar mastery allows accurate parsing of sentences, logical ability helps connect these sentences into coherent arguments, and schemata enrich interpretation with relevant background knowledge. A deficiency in any of these components can significantly weaken overall comprehension. When combined, they offer a more holistic explanation of comprehension performance than any single factor alone. This integrated approach reflects the complexity of reading, which is both a linguistic and cognitive activity grounded in prior knowledge. In Indonesian academic contexts, successful readers demonstrate a balance of these three skills[7,8,19]. Therefore, analyzing their simultaneous contribution can provide a robust model for predicting university students' reading comprehension. This integrated model justifies the hypothesis that grammar mastery, logical ability, and schemata jointly determine comprehension outcomes.

H4. *Grammar mastery, logical ability, and schemata simultaneously and significantly predict university students' reading comprehension in the Indonesian language.*

As a consequence of the previous explanation, theoretically, the predicting model of grammar mastery, logical ability, and schemata on reading comprehension in Indonesian language of university students is illustrated in **Figure 1**.

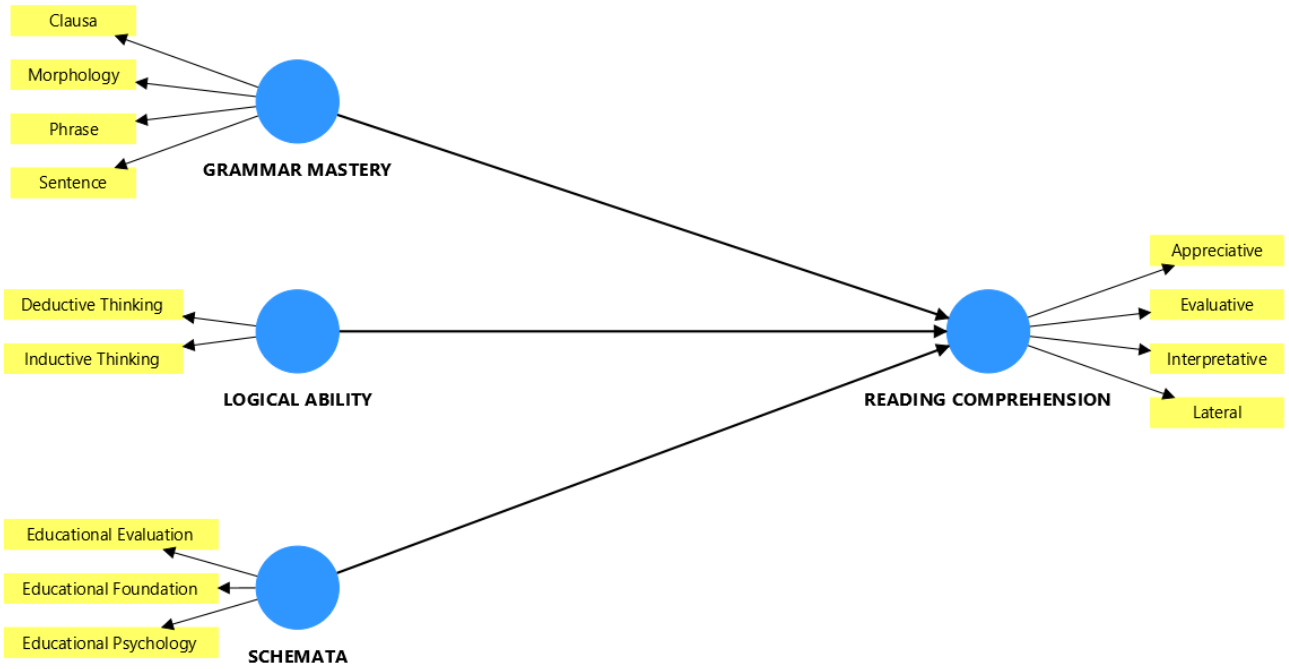

Figure 1. Theoretical model regarding the predictors of reading comprehension in Indonesian language.

4. Materials and Methods

4.1. Research Design

This study adopted a non-experimental survey design with a quantitative approach to examine the predictive effects of grammar mastery, logical ability, and schemata on university students' reading comprehension in the Indonesian language. The non-experimental design was appropriate because the research investigated naturally occurring variables without manipulation, allowing for the analysis of associations and potential mediating effects within an educational context. As outlined by John W. Creswell and J. David Creswell[48], survey research facilitates systematic data collection from large populations to explore relationships among variables, while quantitative methods, as emphasized by Cohen et al.[49], ensure objectivity and enable statistical validation of hypothesized relationships. Two categories of variables were identified: exogenous and endogenous. Grammar mastery, logical ability, and schemata were classified as exogenous variables, representing external predictors, whereas reading comprehension in the Indonesian language was designated as the endogenous variable, representing the outcome. This design enabled a robust examination of the extent to which the exogenous variables influenced the endogenous variable. The survey method provided comprehensive, systematic data on students' reading comprehension alongside their grammar mastery, logical ability, and schemata.

4.2. Participants

This study involved 600 students from a public university in Bandar Lampung, Indonesia, comprising 200 from the Department of Social Science Education (53.46% male, 46.54% female), 200 from the Department of Language and Art Education (55.23% male, 44.77% female), and 200 from the Department of Mathematics and Natural Science Education (47.38% male, 52.62% female). Participants were selected based on their completion of key courses, including Indonesian Language, Logic, Educational Foundation, Educational Psychology, and Basics of Educational Evaluation. A cluster random sampling technique was employed to ensure proportional representation across departments and students' characteristics. As noted by Nguyen et al.[50], this method is particularly advantageous for heterogeneous and geographically dispersed populations, enabling systematic inclusion of distinct subgroups. Moreover, cluster random sampling strengthens the validity and generalizability of the findings by accounting for variations in gender, academic department, and grade level[49]. Selecting participants from multiple departments ensured that the sample reflected the

diversity of the university's students, enhancing the applicability of the results to similar educational contexts.

4.3. Instrument and Data Collection

Data on grammar mastery (GM), logical ability (LO), schemata (SC), and reading comprehension in the Indonesian language (RC) were collected using specially developed test instruments, each evaluated for validity and reliability. The reading comprehension test comprised 34 multiple-choice items, including 13 items assessing the lateral aspect (LA), 14 items for the interpretative aspect (IA), three items for the evaluative aspect (EA), and four items for the appreciative aspect (AA). The grammar mastery test also contained 34 multiple-choice items, with seven morphological items (MO), seven phrasal items (PH), seven clausal items (CL), and 13 sentence-construction items (SE). The logical ability test consisted of 34 multiple-choice items, divided into 16 items on inductive thinking (IT) and 18 items on deductive thinking (DT). The schemata test comprised 34 multiple-choice items, with 11 items on educational foundation (EF), 11 on educational psychology (EP), and 12 on basics of educational evaluation (EE). Following expert judgment, the instruments were piloted on a relevant participant group of 600 university students from a public university in Bandar Lampung, Indonesia. Validity testing indicated that all subscales were within acceptable ranges ($r_{LA} = 0.864$; $r_{IA} = 0.877$; $r_{EA} = 0.827$; $r_{AA} = 0.865$; $r_{MO} = 0.901$; $r_{PH} = 0.898$; $r_{CL} = 0.843$; $r_{SE} = 0.871$; $r_{IT} = 0.801$; $r_{DT} = 0.919$; $r_{EF} = 0.910$; $r_{EP} = 0.870$; $r_{EE} = 0.893$), in line with the criteria of Taylor[51]. Reliability analysis further confirmed internal consistency ($\alpha_{GM} = 0.829$; $\alpha_{LO} = 0.874$; $\alpha_{SC} = 0.803$; $\alpha_{RC} = 0.835$), consistent with thresholds recommended by Hair Jr. et al.[52]. After confirming validity and reliability, the finalized instruments were administered to 600 university students over a six-month period.

4.4. Data Analysis

Data analysis was conducted using Partial Least Squares–Structural Equation Modelling (PLS-SEM), which involves two stages of model assessment: the outer model (measurement model, both reflective and formative) and the inner model (structural model)[53,54]. SmartPLS version 4 was employed to evaluate both models in this study. The outer model assessment examined the reliability and validity of the constructs to ensure the robustness and accuracy of the measurement model. Reliability was assessed through factor loadings, Cronbach's alpha, and composite reliability. Factor loadings measured the strength of the relationship between indicators and their constructs, with values above 0.70 deemed acceptable[55]. Cronbach's alpha assessed internal consistency, with a value of ≥ 0.70 indicating adequate reliability[52]. Composite reliability, reflecting the overall reliability of a construct, was satisfactory when exceeding 0.70, consistent with Fornell and Larcker[56]. Validity was assessed through Average Variance Extracted (AVE) and the Fornell–Larcker criterion. An AVE above 0.50 demonstrated adequate convergent validity, indicating that the construct explained over 50% of the variance in its indicators. Discriminant validity was confirmed when the square root of a construct's AVE exceeded its correlations with other constructs. These metrics ensured that the measurement model accurately represented the constructs, providing a solid basis for structural analysis.

The inner model assessment evaluated the structural relationships among constructs and the overall model fit. Model fit indices included chi-square/df (CMIN), Standardized Root Mean Square Residual (SRMR), and Normed Fit Index (NFI). A good fit was indicated by a chi-square/df value below 5, SRMR below 0.08, and NFI above 0.90[57]. The coefficient of determination (R^2) assessed the explanatory power of the model, with values of 0.75, 0.50, and 0.25 interpreted as substantial, moderate, and weak, respectively[55]. Path coefficients measured the strength and direction of hypothesized relationships, with significance determined through t-statistics or p-values ($p < 0.05$). These combined assessments ensured that the structural model was both statistically robust and theoretically sound.

5. Results

5.1. Outer Model Assessment

The factor loading values in **Table 1** indicate that all indicators demonstrate strong relationships with their respective latent variables, as all values exceed the recommended threshold of 0.70[55]. For the reading comprehension construct, the interpretative aspect (0.833) and evaluative aspect (0.906) show the highest contributions, suggesting

these skills are central to measuring students' comprehension in the Indonesian language. Within grammar mastery, the phrase (0.928) and clause (0.924) exhibit the strongest loadings, reflecting their importance in capturing students' grammatical competence. Logical ability is represented with exceptionally high loadings for both inductive thinking (0.940) and deductive thinking (0.937), indicating balanced and robust measurement of reasoning skills. Schemata indicators also display strong loadings, with educational foundation (0.920) being the highest, underscoring its pivotal role in students' background knowledge relevant to reading comprehension.

Table 1. The factor loadings of each indicator.

Latent Variable	Indicator	Loading Factor
Reading comprehension	Lateral Aspect	0.813
	Interpretative Aspect	0.833
	Evaluative Aspect	0.906
	Appreciative Aspect	0.794
Grammar Mastery	Morphology	0.876
	Phrase	0.928
	Clause	0.924
	Sentence	0.799
Logical Ability	Inductive Thinking	0.940
	Deductive Thinking	0.937
Schemata	Educational Foundation	0.920
	Educational Psychology	0.903
	Basics of Educational Evaluation	0.899

The reliability and validity results in **Table 2** indicate that all latent variables meet the recommended thresholds for strong measurement quality. Cronbach's Alpha values range from 0.857 to 0.905, exceeding the 0.70 benchmark and thus confirming high internal consistency across all constructs. Composite reliability scores, which range from 0.862 to 0.904, also surpass the 0.70 standard, further supporting the robustness of the constructs. The Average Variance Extracted (AVE) values, all above 0.70, demonstrate excellent convergent validity, as they indicate that each construct explains more than 70% of the variance in its indicators. Overall, these results confirm that the measurement model for reading comprehension, grammar mastery, logical ability, and schemata is both reliable and valid for further structural analysis.

Table 2. Reliability construct and validity construct of model.

Latent Variable	Cronbach's Alpha	Composite Reliability	AVE
Reading Comprehension	0.857	0.862	0.701
Grammar Mastery	0.905	0.904	0.780
Logical Ability	0.865	0.865	0.881
Schemata	0.893	0.896	0.823

The results in **Table 3** confirm that discriminant validitywas achieved for all constructs based on the Fornell–Larcker criterion. The square roots of the AVE, displayed on the diagonal (0.837 for Reading Comprehension, 0.883 for Grammar Mastery, 0.939 for Logical Ability, and 0.907 for Schemata), are all higher than the correlations between each construct and the others. For instance, Reading Comprehension's diagonal value of 0.837 is greater than its correlations with Grammar Mastery (0.827), Logical Ability (0.802), and Schemata (0.800), indicating that it shares stronger associations with its own indicators than with other constructs. Logical Ability exhibits the highest discriminant validity with a square root of AVE of 0.939, which clearly exceeding its correlations with all other constructs. These results confirm that each latent variable is empirically distinct, thereby minimizing the risk of multicollinearity and supporting the robustness of the measurement model for structural analysis [58].

Table 3. Discriminant validity.

	Reading Comprehension	Grammar Mastery	Logical Ability	Schemata
Reading Comprehension	0.837			
Grammar Mastery	0.827	0.883		
Logical Ability	0.802	0.749	0.939	
Schemata	0.800	0.784	0.725	0.907

The collinearity statistics in **Table 4** indicate that all Variance Inflation Factor (VIF) values are well below the commonly accepted threshold of 5.0, suggesting the absence of serious multicollinearity issues among the indicators of each latent variable. The highest VIF value is observed for the "Clause" indicator under Grammar Mastery (4.551), which is still within the acceptable range, indicating that its shared variance with other indicators dose not pose a significant concern. Among the Reading Comprehension indicators, "Evaluative Aspect" shows the highest VIF (2.990), but this still reflects a healthy level of collinearity. Logical Ability indicators exhibit moderate VIF values (2.382 and 2.831), suggesting that both inductive and deductive thinking contribution in a balanced manner to the construct. Overall, these results confirm that the outer model indicators are sufficiently independent, thereby ensuring stable and reliable parameter estimates in subsequent analyses [55].

Table 4. Collinearity statistics for outer model.

Latent Variables	Indicators	VIF
Reading Comprehension	Lateral Aspect	1.789
	Interpretative Aspect	2.185
	Evaluative Aspect	2.990
	Appreciative Aspect	1.783
Grammar Mastery	Morphology	2.957
	Phrase	3.251
	Clause	4.551
	Sentence	1.731
Logical Ability	Inductive Thinking	2.382
	Deductive Thinking	2.831
Schemata	Educational Foundation	2.822
	Educational Psychology	2.639
	Basics of Educational Evaluation	2.530

5.2. Inner Model Assessment

As shown in **Table 5,** the Variance Inflation Factor (VIF) values for all predictors in the inner model are below the critical threshold of 5.0, indicating the absence of multicollinearity among the independent variables. Grammar Mastery, with a VIF of 3.155, exhibits the highest collinearity value, but it remains within the acceptable range, suggesting that it contributes unique variance to predicting Reading Comprehension. Logical Ability demonstrates the lowest VIF (2.566), indicating it is the most independent predictor relative to the others in the model. Schemata shows a moderate VIF of 2.927, reflecting a balanced relationship with the other predictors without causing redundancy. Overall, these results confirm that Grammar Mastery, Logical Ability, and Schemata can be included together in the structural model without multicollinearity concerns, ensuring stable estimates of their predictive effects [55].

Table 5. Collinearity statistics for inner model.

Predictor	VIF
Grammar Mastery → Reading Comprehension	3.155
Logical Ability → Reading Comprehension	2.566
Schemata → Reading Comprehension	2.927

An R-square adjusted value of 0.780 indicates that grammar mastery, logical ability, and schemata collectively explain 78% of the variance in reading comprehension in the Indonesian language among university students. This represents a substantial level of explanatory power according to Hair et al.[59], showing that the model captures most of the important factors influencing the dependent variable. The high R-square adjusted also suggests that these three predictors are strong determinants of students' reading comprehension performance in the Indonesian language context. The adjusted value, slightly lower than the unadjusted R-square, accounts for the number of predictors in the model, confirming that the result is not inflated by model complexity. Overall, this finding highlights the strong predictive validity of the model and reinforces the central role of grammar mastery, logical ability, and schemata in understanding reading comprehension outcomes.

The results represented in **Table 6** show that grammar mastery has an F-square value of 0.198, indicating a medium effect size on reading comprehension based on the guidelines established by Cohen[60]. Logical ability also records an F-square value of 0.198, which likewise represents a medium effect size, suggesting it contributes comparably to grammar mastery in predicting reading comprehension. Schemata has an F-square value of 0.121, indicating a small to medium effect size, meaning its contribution is weaker than the other two predictors but still meaningful. The similar effect sizes of grammar mastery and logical ability imply that both skills are equally critical in influencing students' reading comprehension in the Indonesian language. Overall, the data suggest that while all three predictors significantly contribute, grammar mastery and logical ability exert stronger predictive impacts than schemata.

The structural model shows a chi-square/df ratio of 2.372, which is well below the threshold of 5, indicating an acceptable model fit (See **Table 7**). The SRMR value is 0.069, which falls bellow the 0.08 benchmark, suggesting minimal differences between the predicted and observed correlations. However, the NFI value of 0.804 falls short of the recommended 0.90 threshold, indicating that the model's fit compared to a null model is less than optimal. This combination of results implies that while the model performs well in terms of absolute and residual fit measures, there is room for improvement in incremental fit.

Table 6. The results of F-square.

Predictors	Reading Comprehension
Grammar Mastery	0.198
Logical Ability	0.198
Schemata	0.121

Table 7. The fitting indicators of structural model.

Model	X^2/df	SRMR	NFI
Value	2.372	0.069	0.804

Overall, the structural model can be considered reasonably adequate, but further refinement may be needed to enhance its comparative fit quality[57] (See **Figure 2**).

To examine the proposed hypotheses, the t-test was applied using a threshold p-value of less than 0.05 (See **Table 8**). The results represented in **Table 8** show that all three predictors—grammar mastery, logical ability, and schemata—have significant positive effects on reading comprehension in the Indonesian language. Grammar mastery has the highest path coefficient (0.365), indicating that it is the strongest predictor, with a t-value of 4.091 and a p-value of 0.000, confirming strong statistical significance. Logical ability follows closely with a path coefficient of 0.330, a t-value of 4.158, and a p-value of 0.000, also indicating a highly significant influence. Schemata, while having the smallest path coefficient (0.274), still exerts a meaningful effect on reading comprehension, supported by a t-value of 3.402 and a p-value of 0.001. These results collectively suggest that grammar mastery, logical ability, and schemata each make distinct and statistically significant contributions to predicting students' reading comprehension.

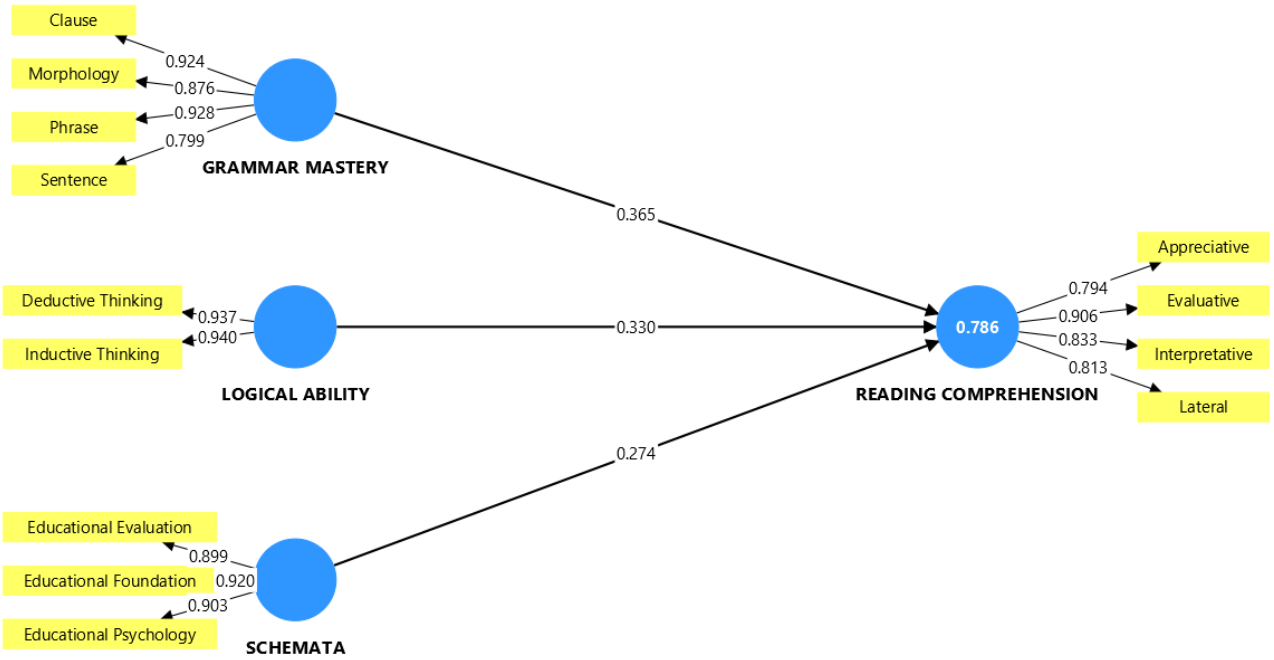

Figure 2. Structural fit model of the effect of grammar mastery, logical ability, and schemata on reading comprehension in Indonesian language.

Table 8. Path coefficients and t-test.

Relationships	Path Coefficient	T-Value	*P*-Value
Grammar Mastery → Reading Comprehension	0.365	4.091	0.000
Logical Ability → Reading Comprehension	0.330	4.158	0.000
Schemata → Reading Comprehension	0.274	3.402	0.001

6. Discussion

6.1. Grammar Mastery, Logical Ability, and Schemata as the Predictors of University Students' Reading Comprehension in the Indonesian Language

The findings of this study reveal that grammar mastery significantly predicts university students' reading comprehension in the Indonesian language, with the highest path coefficient among all predictors. This result is consistent with previous studies, such as those by Sumantri et al. [20] and Hemmati and Kashi [61], which emphasized that grammatical knowledge provides the structural foundation for understanding texts. In the Indonesian language, mastery of morphology, phrases, clauses, and sentence structures enables readers to process and interpret meaning more accurately. This supports the notion that comprehension is not merely a vocabulary-based skill but also depends on the ability to decode grammatical relationships within a text. Similar findings were also reported by Murtisari et al. [9], who found a strong correlation between grammatical competence and academic reading performance. The significant effect observed in this study can be explained by the fact that Indonesian syntax often carries nuanced meanings that depend on word order and affixation. Without sufficient grammar mastery, students may misinterpret key information in a passage. The ability to parse grammatical structures allows readers to connect ideas logically and understand the author's intended meaning [1]. Thus, grammar mastery functions as a cognitive tool that supports accurate decoding, inference-making, and overall comprehension. These findings reinforce the theoretical view that grammar is a core component of reading comprehension processes in both first and second language contexts.

The study also found that logical ability significantly predicts university students' reading comprehension in the Indonesian language, with a path coefficient slightly below

that of grammar mastery. This finding align with research by Bishara[62] and Nouwens et al.[63], which showed that reasoning skills enhance text comprehension by facilitating the evaluation of arguments and relationships within the text. Logical ability, encompassing inductive and deductive thinking, enables students to identify patterns, make predictions, and draw conclusions from information presented in reading materials. In the context of the Indonesian language, where inferential comprehension often requires connecting implicit clues, logical reasoning is indispensable. Similar results were obtained by Sagirli[64], who reported that students with high logical thinking skills performed better in critical reading tasks. The significant role of logical ability can be attributed to the fact that reading comprehension involves both surface-level understanding and deeper interpretative reasoning. Logical ability helps readers distinguish between main ideas and supporting details, detect inconsistencies, and evaluate the validity of information. It also aids in synthesizing information from multiple parts of a text into a coherent whole[25]. Therefore, strong logical ability supports the construction of accurate mental representations of the text, which is essential for academic reading in the Indonesian language. These findings reinforce the importance of integrating critical thinking and reasoning skills in reading instruction.

Another important finding is that schemata significantly predict university students' reading comprehension in the Indonesian language, although its path coefficient is the smallest among the three predictors. This result is consistent with schema theory as proposed by Spencer and Wagner[65], which states that background knowledge structures play a vital role in interpreting new information. In the Indonesian language, schemata in the form of educational foundation, educational psychology, and educational evaluation knowledge help readers understand academic texts in education-related contexts. Studies by Friesen and Frid[66] and Liu and Chen[67] also confirm that activating prior knowledge enhances comprehension, particularly in specialized domains. The significant role of schemata in this study may be due to the contextual nature of Indonesian academic reading tasks, which often require familiarity with subject-specific concepts. When students can relate new information to existing schemata, they process it more efficiently and with deeper understanding. Without adequate schemata, readers may struggle to grasp implicit references, technical terms, and contextual cues in the text[68]. Schemata also facilitate inference-making, enabling readers to fill in gaps where information is omitted. Thus, the results highlight the importance of content knowledge and prior learning experiences in enhancing reading comprehension[69]. These findings suggest that building domain-specific schemata should be a key focus in Indonesian language education.

The combined analysis revealed that grammar mastery, logical ability, and schemata significantly and simultaneously predict reading comprehension in the Indonesian language, with an R-square adjusted value of 0.780. This means that together, these three variables explain 78% of the variance in students' reading comprehension scores, indicating a strong predictive model. These results align with the multi-component view of reading comprehension, as discussed by Hjetland et al.[29] and Zhang and Koda[70], which emphasizes the interaction of linguistic knowledge, reasoning skills, and background knowledge. Previous studies, such as that by Sari et al.[19], also found that reading performance is best explained by the integration of language knowledge, cognitive skills, and prior knowledge. The synergy of these predictors can be explained by the fact that comprehension requires decoding language structures (grammar), reasoning about information (logic), and connecting to prior knowledge (schemata)[62]. In Indonesian language contexts, this integration is particularly important because texts often contain complex syntactic structures, require inferential reasoning, and draw on culturally embedded knowledge[9]. When grammar mastery, logical ability, and schemata are all strong, students can process texts more efficiently and accurately. Conversely, weaknesses in one or more areas can hinder comprehension despite strengths in others[71]. Therefore, these findings highlight the need for a holistic approach to reading instruction that develops all three components simultaneously. This integrative view is supported by empirical and theoretical work in both first and second language literacy research.

6.2. The Implications for Language Education of Indonesian

From a theoretical perspective, this study reinforces the multi-dimensional nature of reading comprehension in the Indonesian language. It supports schema theory, cognitive

load theory, and linguistic processing theories by demonstrating that grammar mastery, logical ability, and schemata all contribute significantly to comprehension outcomes. These findings provide empirical evidence that reading comprehension is not a single cognitive skill but an interaction of multiple competencies. In the Indonesian language context, where morphology and syntax play a crucial role in meaning-making, grammar emerges as a particularly strong predictor. Logical ability's role supports models of critical and analytical reading, which posit that reasoning skills are necessary for higher-level comprehension. Schemata's influence validates the premise that prior knowledge frames the interpretation of new information. Together, these predictors offer a comprehensive theoretical model that integrates linguistic, cognitive, and knowledge-based perspectives. This integrative framework aligns with interactive models of reading proposed by Mathews and O'Donnell[72]. It also suggests refinements to existing theories by emphasizing the equal importance of language structure and reasoning processes alongside background knowledge. Thus, this study contributes to a deeper theoretical understanding of reading comprehension in academic Indonesian language contexts.

From a practical standpoint, the findings suggest that reading instruction in Indonesian universities should target simultaneous improvement in grammar mastery, logical ability, and schemata. Language instructors should integrate grammar teaching into reading activities rather than treating it as an isolated skill. Critical thinking and logical reasoning exercises should be embedded into reading comprehension tasks to enhance cognitive processing of texts. Additionally, pre-reading activities that activate relevant schemata can help students connect prior knowledge with new information. Curriculum developers should design integrated learning modules that address linguistic, cognitive, and content knowledge development. Assessment practices should also measure these three components to provide a more complete picture of students' reading abilities. Teacher training programs should prepare educators to teach reading as a multi-component skill. Furthermore, instructional materials should include texts from diverse academic domains to expand students' schemata. By implementing such approaches, educators can foster stronger and more holistic reading comprehension skills in Indonesian university students. This integration of theory into practice can ultimately improve academic performance and lifelong learning.

6.3. Limitations and Suggestions

Despite its contributions, this study has several limitations. First, it focused exclusively on university students from a single public university in Bandar Lampung, which limits the generalizability of the findings to other regions or educational levels. Second, the study employed a quantitative design, which, while providing statistical rigor, did not capture qualitative insights into students' reading processes. Third, the measures of grammar mastery, logical ability, and schemata were limited to multiple-choice formats, which may not fully reflect real-world reading abilities. Fourth, the content of the schemata test was confined to educational foundation, psychology, and evaluation, potentially overlooking other relevant domains. Fifth, reading comprehension was measured only in the Indonesian language, so the results may not apply to bilingual or multilingual contexts. Sixth, the cross-sectional design prevents conclusions about causality, even though strong correlations were found. Seventh, potential confounding variables such as motivation, reading habits, and metacognitive strategies were not examined. Eighth, the study relied on self-contained test instruments without triangulation from other data sources. Ninth, the predictive model may change if different populations or more diverse text types are used. Finally, the findings, while robust, should be interpreted within the methodological and contextual constraints of the study.

To address these limitations, future research should involve a more diverse sample, including students from multiple universities and regions in Indonesia. Expanding the participant pool to different educational levels could help determine whether the predictors operate similarly across age groups. Qualitative methods, such as think-aloud protocols or interviews, should be used alongside quantitative tests to gain richer insights into students' reading processes. The test instruments could be diversified to include open-ended responses, performance-based tasks, and authentic reading materials. Schemata measures should be broadened to include knowledge from various academic and cultural domains. Longitudinal designs could track changes in grammar mastery, logical ability, and schemata over time to explore causal relationships. Incorporating bilingual or multilingual reading comprehension tasks would help assess the general-

izability of the findings to other linguistic contexts. Potential confounding factors such as motivation, prior reading experience, and metacognitive strategies should also be examined. Using mixed-methods designs could provide a more holistic understanding of the predictors of reading comprehension. These improvements would enhance the robustness, applicability, and theoretical contribution of future studies.

7. Conclusions

In conclusion, this study demonstrates that grammar mastery, logical ability, and schemata each significantly predict university students' reading comprehension in the Indonesian language, with grammar mastery emerging as the strongest predictor. Logical ability and schemata also play important roles, indicating that reading comprehension is influenced by a combination of linguistic, cognitive, and knowledge-based factors. Together, these predictors explain 78% of the variance in reading comprehension, underscoring the strength of the model. The findings are consistent with theoretical models of reading that emphasize the interaction of decoding skills, reasoning, and prior knowledge. They also align with empirical studies across languages and contexts, reinforcing the generalizability of these relationships. The study's theoretical implications highlight the multi-component nature of reading, while the practical implications point to the need for integrated instruction targeting all three predictors. Although the research has limitations, its contributions are significant for both theory and practice in Indonesian language education. By addressing the identified limitations, future research can build on these findings to refine our understanding of reading comprehension processes. Ultimately, strengthening grammar mastery, logical ability, and schemata can lead to more effective reading instruction and improved academic performance. This integrated approach offers a comprehensive pathway to developing proficient readers in Indonesian universities.

Author Contributions

E.S. and S.S. contribute in designing the test instruments, consisting of reading comprehension, grammar mastery, logical ability, and schemata. N.A.N. and V.F. contribute in administrating the test instruments to the participants and collecting the data. Meanwhile, M.W. and M.N. contribute in organizing and analyzing the data, and interpreting it. All authors have read and agreed to the published version of the manuscript.

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Institutional Review Board Statement

The study was conducted in accordance with the Declaration of Helsinki, and approved by the Institutional Review Board of University of Lampung.

Informed Consent Statement

Informed consent was obtained from all subjects involved in the study.

Data Availability Statement

The data regarding grammar mastery, logical ability, schemata, and reading comprehension in Indonesian language among university students can be accessed by contacting the corresponding author.

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Conflicts of Interest

The authors declare no conflict of interest.

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