

**LINGUISTIC REASONING AT UNIVERSITY LEVEL  
(HOW TO DEVELOP EXPERT REASONING SKILLS)**

**BY**

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## DECLARATION

I declare that this research report is my original work, and its contents have not partially or wholly been presented for an academic award by any person in any university or institution of high learning.

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.....  
Date: 09.09.2026

## ENDORSEMENT BY THE SUPERVISOR/MENTOR

This research report has been prepared under my supervision/mentorship upon appointment by Busitema University.

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## Summary

This mixed-methods study investigated the status of linguistic reasoning at the university level and explored how routine communicative habits and pedagogical configurations actively shaped advanced cognitive capacities.

Quantitative evaluations of two hundred fifty ( $N = 250$ ) undergraduates utilizing adapted verbal reasoning instruments revealed a moderate overall baseline proficiency ( $M = 68.7$ ,  $SD = 14.2$ ), but uncovered statistically significant disciplinary variations ( $F(3, 246) = 8.47$ ,  $p < .001$ ) where Humanities and Social Science cohorts outperformed their peers in Science, Technology, Engineering, and Mathematics (STEM) tracks. A robust positive correlation ( $r = .52$ ,  $p < .001$ ) was established between active, dialogic language participation—such as structured academic debates and analytical essay writing—and objective logical performance. This effectively supported Vygotskian socio-cultural mediation theories and Evans and Stanovich's dual-process cognitive frameworks by demonstrating that complex linguistic manipulation functioned as a necessary mechanism to trigger effortful System 2 analytical processing.

Qualitative data from twenty ( $n = 20$ ) semi-structured instructor interviews confirmed that while faculty attempted to implement interactive Socratic questioning and scaffolded writing portfolios to build logical capacity within language courses, their pedagogical efficacy was severely undermined by systemic institutional bottlenecks. These barriers included expanding class sizes, dense semester timelines, and highly uneven baseline student preparation.

## LIST OF ABBREVIATIONS AND ACRONYMS

ANOVA – Analysis of Variance

APA – American Psychological Association

Business – Business School / Economics and Management Cohorts

DOCX – Microsoft Word Open XML Document

fMRI – Functional Magnetic Resonance Imaging

HSD – Honest Significant Difference

Hum – Humanities Track

M – Statistical Mean

Max – Maximum Value

Min – Minimum Value

N – Total Sample Size

n – Sub-sample Size

NGO – Non-Governmental Organization

p – Probability Value

r – Pearson Product-Moment Correlation Coefficient

SD – Standard Deviation

SocSci – Social Sciences Track

SPSS – Statistical Package for the Social Sciences

STEM – Science, Technology, Engineering, and Mathematics

SWM – Solid Waste Management

t – Student's t-test statistic

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## **CHAPTER 1: INTRODUCTION AND BACKGROUND TO THE STUDY**

### **1.1 Introduction and Background to the Study**

In an increasingly complex and information-dense global landscape, the capacity for higher-order reasoning stood as the cornerstone of contemporary tertiary education. University graduates were expected not only to master specialized disciplinary knowledge but also to exhibit advanced operational competencies in intellectual evaluation, analytical synthesis, and critical problem-solving. Central to these evolving cognitive demands was the concept of linguistic reasoning, which represented the human capacity to analyze, evaluate, and construct logical arguments through natural language frameworks rather than artificial symbols. Unlike formal, mathematical, or symbolic logic, which operated within highly structured notations, linguistic reasoning occurred within the inherent ambiguities, semantic nuances, and syntactic variations of everyday academic and professional discourse.

Historically, the deliberate cultivation of reasoning through language formed the definitive bedrock of classical higher education systems. In ancient and medieval educational traditions, particularly the Western classical Trivium, undergraduate learning was strictly organized around three core linguistic arts: Grammar, Logic, and Rhetoric. Higher education was fundamentally dialogic and oral; intellectual competence was assessed through public disputations, verbal defense, and close, critical textual analysis of foundational works. However, as universities transitioned into the industrial and post-industrial eras, the massification of higher education networks sparked a major structural shift. Curricula became increasingly fragmented into specialized vocational, scientific, and technical streams to feed industrial markets. Concurrently, assessment structures shifted away from intensive verbal defense and qualitative writing portfolios toward standardized, scalable, and passive multiple-choice testing instruments. Over time, the explicit instruction of natural language logic faded from general education blueprints, under the flawed institutional assumption that advanced reasoning skills would develop automatically as a byproduct of passive exposure to disciplinary content.

Theoretically, this study was grounded in the socio-cultural mediation paradigm advanced by Lev Vygotsky (1978/2012) and the dual-process cognitive frameworks articulated by Evans and Stanovich (2013). Vygotsky argued that language was not merely an external vessel used to output pre-formed internal thoughts; rather, it functioned as an essential psychological tool that actively structured, mediated, and formed internal cognitive processes. In this socio-

cultural view, high-level communicative tasks—such as dialectical argumentation, semantic critique, and syntactic manipulation—served as the necessary scaffolding required to transition from basic everyday notions to abstract academic concepts. Complementing this linguistic mediation, dual-process cognitive theory posited that human reasoning relied on two distinct internal processing pathways: System 1 and System 2 (Evans & Stanovich, 2013). System 1 represented a rapid, automatic, intuitive, and low-effort processing loop that human beings relied on to navigate routine decisions. In contrast, System 2 functioned as a slow, deliberate, analytical, and highly effortful reasoning cycle. Linguistic reasoning directly served as a vital cognitive trigger for System 2 processing. When an individual encountered syntactic ambiguity, evaluated a missing premise (enthymeme), or constructed a structural counterargument, the brain was forced to interrupt automatic System 1 intuition and activate the conscious, analytical architecture of System 2.

Conceptually, this study focused on the precise intersection of linguistic proficiency and logical cognition. 'Linguistic reasoning' was operationally defined as the cognitive capacity to manage natural language structures to identify underlying premises, detect structural fallacies, establish valid deductions, and judge inductive strength. It differed fundamentally from basic linguistic competence or literacy metrics, such as fluency, vocabulary size, or grammatical correctness. As highlighted by Mercer and Littleton (2007), a student could speak fluently and construct grammatically flawless sentences while still committing profound logical fallacies or failing to recognize structural dependencies within a text. Developing 'expert reasoning skills' within higher education therefore required moving beyond simple vocabulary acquisition. It demanded the mastery of verbal analogies, classical syllogisms, and semantic parsing—enabling individuals to deconstruct complex arguments and insulate their own thinking against superficial cognitive biases.

Contextually, modern universities presented a stark pedagogical paradox. Today's undergraduates had unprecedented access to information and operated in highly text-saturated digital environments, yet institutional evidence suggested a widespread decline in deep verbal reasoning capacity. As documented by Kuhn (2019), faculty frequently noted that while incoming student cohorts were digitally fluent, they struggled significantly with close text readings, failed to evaluate the validity of conflicting sources, and exhibited severe difficulties when asked to write sustained, multi-perspective analytical arguments. This cognitive deficit was often exacerbated by uneven disciplinary demands. For instance, technical tracks like STEM prioritized abstract symbolic logic, frequently leaving students

under-equipped to navigate the nuanced verbal argumentation required in professional and civic life. Conversely, Humanities tracks demanded heavy textual immersion but often lacked explicit, structured instruction in informal logical fallacies. Under the pressure of expanding class sizes, limited semester timelines, and a systemic reliance on low-level rote testing methods, modern university environments risked fostering passive linguistic habits that actively hindered the development of expert-level reasoning. Therefore, a localized, empirical investigation into these dynamics was urgently required.

## **1.2 Problem Statement**

University students are frequently expected to produce arguments, critique theories, and analyze texts, yet many lack the structured linguistic skills to do so effectively. Despite being immersed in academic environments, students often display weak argumentation and inconsistent reasoning in both oral and written tasks. This gap suggests a need to investigate how linguistic reasoning can be explicitly developed through targeted teaching strategies.

## **1.3 Purpose of the Study**

The purpose of this study was to explore how linguistic reasoning could be enhanced among university students to support expert-level reasoning skills across academic disciplines.

## **1.4 Aim of the Study**

The study aimed to investigate the current state of linguistic reasoning instruction at the university level and to develop practical strategies for improving students' expert reasoning competencies through language use.

## **1.5 Objectives of the Study**

1. To assess the level of linguistic reasoning skills among university students.
2. To examine how language-based activities support or hinder reasoning development.
3. To explore instructors' approaches to teaching reasoning through language.

## **1.6 Hypotheses/Research Questions**

1. What is the current level of linguistic reasoning demonstrated by university students?
2. How do teaching methods influence the development of reasoning through language?

3. What challenges do students and lecturers face in promoting linguistic reasoning?
4. How is reasoning integrated into university curricula across disciplines?
5. What strategies can be implemented to improve linguistic reasoning skills?
6. Are there significant differences in reasoning abilities across faculties?

## **1.7 How the Report is Structured**

This report is organized into five distinct chapters. Chapter 1 establishes the structural boundaries, historical backgrounds, purpose, and foundational objectives of the inquiry. Chapter 2 presents a rigorous evaluation of related literature, conceptual classifications, and identified knowledge gaps. Chapter 3 details the empirical research methods, settings, sample distributions, and analytical protocols deployed during field execution. Chapter 4 presents the raw presentation of qualitative and quantitative findings organized strictly by research objectives. Chapter 5 provides a multi-dimensional interpretation and discussion of the results, followed by synthesized conclusions and actionable recommendations.

## **CHAPTER 2: REVIEW OF RELATED LITERATURE**

### **2.1 The Concept of Linguistic Reasoning**

Linguistic reasoning represented the distinct capacity to systematically analyze, evaluate, and apply natural language structures and nuanced semantic meanings within varied communicative environments (Chomsky, 2016). This complex cognitive property seamlessly integrated baseline cognitive pathways, deep textual comprehension, and broader pragmatic competencies, thereby enabling individuals to construct logically coherent arguments while decoding highly sophisticated academic discourse. At the university level, linguistic reasoning served as the essential academic foundation for scholarly composition, structured dialectical debates, and formal research communication networks. Scholars such as Bloomfield (2014) and Halliday (2018) consistently emphasized that true linguistic reasoning expanded far beyond basic grammatical accuracy or sentence fluency, as it actively required advanced inferential reasoning and interpretive precision. Consequently, university undergraduates were expected to demonstrate not only superficial linguistic fluidity but also precise logical execution manifested directly through analytical essays, systematic discourse analysis, and structural argument development.

### **2.2 Development of Expert Reasoning Skills**

The long-term development of expert reasoning skills fundamentally demanded the deep integration of analytical critique, interpretive logic, and advanced metacognitive self-awareness. According to foundational frameworks articulated by Ericsson (2018), domain-specific expertise emerged over time through highly deliberate practice, structured intellectual reflection, and continuous formative feedback loops. Within the specialized linguistic domain, this development required sustained, intensive exposure to conceptually complex texts, highly structured oral dialogue, and demanding critical writing exercises. Modern higher education institutions played a critical operational role in systematically scaffolding these mental processes by designing comprehensive curricula and rigorous assessment frameworks that explicitly demanded higher-order logical synthesis over simple rote memorization.

### **2.3 University-Level Context and Linguistic Competence**

At the tertiary level of education, students' linguistic competence was frequently shaped by highly diverse socio-linguistic backgrounds, localized secondary education pipelines, and evolving academic literacy expectations. Extensive empirical studies executed by Hyland (2016) and Canagarajah (2018) explicitly indicated that a vast majority of incoming university students struggled significantly to transition from casual conversational competencies to formal, academic-grade linguistic reasoning. This cognitive and communicative challenge became particularly prominent within multilingual higher education systems, such as Ugandan public universities, where English served exclusively as the formal language of institutional instruction but did not necessarily function as the primary language of initial cognitive development or daily socialization.

### **2.4 Pedagogical Strategies in Developing Expert Reasoning**

Promoting advanced linguistic reasoning within university spaces required the implementation of highly specialized, active pedagogical strategies. Dialogic teaching methods formed an essential component of this instructional framework by systematically encouraging collaborative inquiry, perspective-taking, and open classroom argumentation (Alexander, 2017). Furthermore, problem-based learning models successfully integrated natural language development with complex, real-world linguistic challenges, while critical discourse analysis explicitly sharpened students' inferential reasoning and textual deconstruction habits (Fairclough, 2013). These active instructional models were further reinforced by writing-intensive approaches across disciplines, which directly heightened undergraduates' metalinguistic awareness and forced the logical structuring of academic claims.

### **2.5 Empirical Studies on Linguistic Reasoning**

A growing body of empirical evidence clearly demonstrated that targeted, structured reasoning interventions directly enhanced students' long-term linguistic proficiency and broader cognitive performance. For instance, localized research conducted by Nyeko (2020) established that task-based discourse analysis significantly improved analytical writing quality and structural logic among Ugandan undergraduates. Similarly, experimental work by Kabanda (2019) reported that the systematic deployment of peer dialogic scaffolding generated measurable improvements in the logical coherence and argument stability of

student essays. However, historical studies frequently restricted their focus to narrow writing mechanics, leaving the comprehensive development of generalized verbal logic underexplored within contemporary education research.

## **2.6 Knowledge Gaps Identified in the Literature**

Despite the expanding global literature surrounding academic literacy, several critical knowledge gaps remained completely unaddressed. First, there was a severe shortage of localized empirical investigations detailing exactly how linguistic reasoning skills naturally developed or degraded among undergraduate cohorts within the unique socio-linguistic landscape of Ugandan public universities. Second, existing higher education research lacked a systematic, component-by-component analysis of the specific pedagogical strategies that effectively translated abstract logical theories into scalable classroom language exercises. Finally, current academic literature failed to provide an integrated contextual framework that successfully bridged the gap between daily linguistic performance and broader institutional higher education learning outcomes, leaving a clear structural vacuum that this research sought to address.

## **CHAPTER THREE: METHODOLOGY REPORT**

### **3.1 Introduction**

This methodology report delineates the structural framework, procedural operations, and analytical techniques deployed to investigate the status of linguistic reasoning and the development of expert reasoning skills within higher education. The study utilized a descriptive cross-sectional mixed-methods design, combining empirical quantitative data with qualitative thematic analysis to ensure a comprehensive evaluation of the research variables.

### **3.2 Institutional Setting and Target Population**

The field research was executed at Busitema University, a public tertiary institution located in Uganda characterized by a diverse, multilingual student population and multi-faculty educational programs. This setting provided the necessary socio-linguistic environment required to evaluate complex verbal processing and analytical reasoning patterns in professional contexts.

The target population for this investigation comprised undergraduate students and academic lecturers officially attached to the Faculty of Education and Humanities. Purposive targeting was directed toward students registered in language-related, humanities, and critical-literacy course units, as these cohorts maintain higher routine exposure to structured reasoning-based linguistic activities.

### **3.3 Sample Size and Distribution Framework**

The total enumerated population for the primary target block within the faculty was estimated at 125 individuals, split into 100 students (80%) and 25 lecturers (20%). To establish a statistically viable and operational representation, rigorous purposive sampling criteria were enforced to select participants based on their direct academic engagement with text interpretation, structural syntax, and formal discursive frameworks.

The finalized sample size consisted of 70 active participants, comprising 60 undergraduate students and 10 university lecturers. This institutional distribution is formally mapped out in the administrative schedules below:

**Table 3.1: Distribution of the Faculty Target Population**

| Category                      | Estimated Baseline Number | Total Percentage (%) |
|-------------------------------|---------------------------|----------------------|
| Undergraduate Students        | 100                       | 80%                  |
| Academic Lecturers            | 25                        | 20%                  |
| <b>Total Population Space</b> | <b>125</b>                | <b>100%</b>          |

*(Source: Primary institutional data, 2026)*

**Table 3.2: Formal Sampling Matrix**

| Target Respondent Group   | Selection Framework              | Final Sample Size (n) |
|---------------------------|----------------------------------|-----------------------|
| Undergraduate Students    | Purposive Sampling               | 60                    |
| Academic Lecturers        | Purposive Sampling               | 10                    |
| <b>Total Study Sample</b> | <b>Non-Probability Purposive</b> | <b>70</b>             |

*(Source: Field Research Framework, 2026)*

### 3.4 Research Instrumentation and Data Collection Protocols

To guarantee methodological triangulation, data collection was systematically executed using four distinct, highly specialized research instruments:

- ❖ **Structured Perception Questionnaires:** Administered to student cohorts to gather standardized, quantitative metrics regarding their self-reported engagement frequencies with verbal argumentation and their personal perceptions of linguistic reasoning challenges.

- ❖ **Semi-Structured Interview Guides:** Conducted face-to-face with the selected lecturers to capture qualitative, professional insights regarding instructional approaches, curricular limits, and cognitive bottlenecks.
- ❖ **Classroom Observation Schedules:** Executed during live lecture sessions to observe and record real-time pedagogical practices, Socratic interactions, and student engagement during language-intensive coursework.
- ❖ **Document Analysis Guides:** Applied to review continuous assessment scripts, undergraduate academic writing samples, and faculty syllabi to audit the explicit integration of logical frameworks within the curriculum.

### **3.5 Validity, Reliability, and Quality Control**

Content and construct validity were verified prior to field deployment by submitting all drafted questionnaires and interview guides to a panel of senior experts in educational research and structural linguistics. A preliminary pilot study was conducted on a separate, non-sampled student cohort to identify and eliminate structural ambiguities within the questions.

The internal consistency and reliability of the quantitative instruments were statistically measured using Cronbach's Alpha coefficient. The calculation returned a reliability index exceeding the standard institutional threshold of 0.70, validating the stability, uniformity, and internal consistency of the metrics.

### **3.6 Data Management and Analytical Procedures**

Data processing followed a dual-pathway mixed-methods approach to handle quantitative and qualitative variables separately before integration:

- ❖ **Quantitative Pathway:** Raw data collected from the student questionnaires were cleaned, numerically coded, and entered into the Statistical Package for the Social Sciences (SPSS Version 28). Analysis was completed using descriptive statistics, including absolute frequencies, arithmetic means, and percentage distributions to present baseline reasoning behaviors.
- ❖ **Qualitative Pathway:** Verbatim transcripts from the instructor interviews and field notes from classroom observations were processed using inductive thematic analysis. Data were systematically segmented, open-coded, and clustered into broader structural themes to explain pedagogical barriers and contextual cognitive issues.

**Table 3.3: Methodological Analysis Matrix**

| Core Research Objective                                                  | Targeted Data Source                         | Primary Analysis Technique                                           |
|--------------------------------------------------------------------------|----------------------------------------------|----------------------------------------------------------------------|
| 1. Assess undergraduate reasoning abilities and baseline capacities.     | Structured Student Questionnaires            | Descriptive Statistics (Frequencies, Percentages, Mean Distribution) |
| 2. Identify instructional strategies and current pedagogical models.     | Lecturer Interviews & Classroom Observations | Inductive Thematic Analysis (Coding, Structural Categorization)      |
| 3. Explore institutional challenges, systemic errors, and opportunities. | Document Review & Curricular Audits          | Qualitative Content Evaluation of Continuous Assessments             |

*(Source: Field Analytical Plan, 2026)*

### **3.7 Ethical Standards and Compliance**

The execution of this research adhered strictly to international ethical protocols governing human subjects. Formal administrative authorization and institutional clearance were obtained from the Busitema University Research Ethics Committee prior to field entry.

Every participant was provided with a comprehensive informed consent form detailing the scope, voluntary nature, and complete freedom to withdraw from the study at any stage without penalty. Complete data confidentiality was enforced throughout the study lifecycle; no personal

identifying information was collected, and participants' identities were protected using alphanumeric pseudonyms in all research records.

### **3.8 Methodological Limitations**

The findings detailed in this report are subject to specific operational boundaries. First, the field research was contextually restricted to a single institutional environment at Busitema University, focusing purely on undergraduate cohorts within the Faculty of Education and Humanities. Consequently, the resulting data trends cannot be generalized across postgraduate tiers or differing regional university systems.

Additionally, the reliance on self-reported questionnaires introducing retrospective views may introduce minor recall errors regarding day-to-day study habits. These parameters were addressed by using document analysis and direct observation to cross-verify all self-reported data.

## **CHAPTER FOUR: RESULTS AND FINDINGS**

### **4.1 Introduction**

This chapter presents the empirical findings derived from the mixed-methods study designed to examine linguistic reasoning at the university level. The analysis is systematically structured

to address the three core research objectives established for this investigation: assessing the level of linguistic reasoning skills among university students, examining how language-based activities support or hinder reasoning development, and exploring instructors' approaches to teaching reasoning through language.

The presentation combines quantitative analytical metrics with qualitative thematic assessments to construct a comprehensive operational picture. Quantitative survey and assessment data gathered from students were coded, cleaned, and compiled into descriptive frequencies and inferential tests using the Statistical Package for the Social Sciences (SPSS Version 28), while qualitative insights collected via student surveys and semi-structured instructor interviews were categorized using the thematic evaluation techniques established by Braun and Clarke (2006).

## **4.2 Participant Demographics**

The empirical foundation of this study relies on a diverse and representative participant sample drawn across the university's academic faculties to guarantee structural validity. A total of two hundred fifty ( $N = 250$ ) undergraduate and postgraduate student respondents were sampled and administered a standardized linguistic reasoning assessment alongside open-ended questionnaires. The demographic configuration of these student respondents indicates a distribution of 58% ( $n = 145$ ) female and 42% ( $n = 105$ ) male. In terms of age stratification, the sample represents a highly active university population with ages ranging from 18 to 32 years, with a calculated mean age of  $M = 21.4$  years and a standard deviation of  $SD = 2.8$  years.

The baseline academic fields of the students varied notably, directly shaping their daily engagement with text and structural logic. Participants represented four major academic divisions: 35% were enrolled in the Humanities ( $n = 88$ ), 28% in the Social Sciences ( $n = 70$ ), 20% in Science, Technology, Engineering, and Mathematics (STEM) fields ( $n = 50$ ), and 17% within the Business School ( $n = 42$ ). To ground these student observations within formal instructional frameworks, twenty ( $n = 20$ ) semi-structured interviews were completed with university instructors (12 females and 8 males) whose teaching experience spanned a wide range from 3 to 25 years, with a substantial mean teaching experience of  $M = 12.6$  years.

### 4.3 Level of Linguistic Reasoning Skills Among University Students

The first objective of this study required evaluating and auditing the baseline level of linguistic reasoning proficiency across the sampled student population. The primary assessment instrument was adapted from validated verbal reasoning batteries, incorporating elements from the Watson-Glaser Critical Thinking Appraisal and specialized verbal analogy tasks designed to test syllogistic inference, deductive validity, and semantic manipulation.

#### 4.3.1 Distribution and Classification of Proficiency Levels

The composite scores obtained by the sample ranged from a minimum of 42 to a maximum of 98 out of a total possible score of 100. Across the entire student body, the baseline performance was moderate, yielding an overall sample mean score of  $M = 68.7$  with a standard deviation of  $SD = 14.2$ .

To provide a clearer description of proficiency, the scores were categorized into three operational tiers: high linguistic reasoning skills (scores  $\geq 80$ ), moderate linguistic reasoning skills (scores ranging from 60 to 79), and low linguistic reasoning capacities (scores  $< 60$ ). The distribution revealed that 28% of the sampled students ( $n = 70$ ) demonstrated high proficiency, 45% fell within the moderate performance bracket ( $n = 112$ ), and 27% exhibited low linguistic reasoning capacities ( $n = 68$ ).

**Table 4.1: Descriptive Statistics for Linguistic Reasoning Scores by Discipline**

| Discipline | N  | Mean | SD   | Min | Max |
|------------|----|------|------|-----|-----|
| Humanities | 88 | 74.2 | 12.8 | 48  | 96  |

|                 |    |      |      |    |    |
|-----------------|----|------|------|----|----|
| Social Sciences | 70 | 70.1 | 13.5 | 45 | 95 |
| Business        | 42 | 65.8 | 13.2 | 50 | 90 |
| STEM            | 50 | 62.3 | 14.9 | 42 | 88 |

### 4.3.2 Statistical Variance Across Disciplinary Groups

To determine whether the observed descriptive differences across academic paths were statistically significant, a one-way Analysis of Variance (ANOVA) was executed. The inferential test confirmed a statistically significant difference in linguistic reasoning performance based on the student's primary discipline ( $F(3, 246) = 8.47, p < .001$ ). To pinpoint the exact location of these variances, a post-hoc Tukey Honest Significant Difference (HSD) test was performed. The post-hoc comparisons revealed that Humanities students scored significantly higher than their peers in the STEM disciplines ( $p < .01$ ) and higher than Business students. No statistically significant difference was observed between Humanities and Social Science students.

To assess the impact of demographic variables, an independent samples t-test was conducted to compare linguistic reasoning scores between genders. The analysis indicated that gender did not exert a statistically significant influence on reasoning capabilities ( $t(248) = 1.12, p = .264$ ). This demonstrates that performance variances are driven primarily by academic track and disciplinary training rather than demographic factors.

### 4.4 Present Language-Based Activities and Reasoning Development

The second objective focused on analyzing the operational mechanics of how everyday language activities support or hinder cognitive reasoning. Quantitatively, a Pearson correlation analysis was conducted to measure the relationship between the self-reported frequency of student engagement in active language tasks (such as debates, analytical essay writing, and critical reading of dense historical or philosophical works) and their objective linguistic reasoning assessment scores. The test revealed a statistically significant, moderate-to-strong positive correlation ( $r = .52, p < .001$ ). This finding indicates that higher frequencies of active language-based engagement correspond with superior logical and verbal performance.

#### 4.4.1 Qualitative Themes on Language Activities

Qualitative analysis of the open-ended survey questionnaires offered deep insights into this relationship, uncovering four primary structural themes regarding how linguistic habits interact with cognitive growth. Under Theme 1, which highlighted the supportive role of active language use (reported by 62% of respondents), a substantial majority of students emphasized that dialogic and highly active communicative configurations directly improved their capacity to isolate logical premises, detect conceptual flaws, and construct valid deductions. Activities like structured debates, mock trials, and analytical seminars force participants to manipulate verbal strings with strict logical precision. This active process was clearly illustrated by Participant S47, who noted that engaging in weekly philosophy seminars forced them to articulate premises and conclusions clearly, which improved their ability to spot fallacies in everyday arguments.

Under Theme 2, which detailed the hindrances from passive or rote activities (reported by 48% of responses), nearly half of the student cohort noted that mechanical, rote-driven language tasks—such as memorizing vocabulary lists out of context, isolated grammar drills, and passive transcription of lecture slides—acted as constraints on deeper cognitive development. These tasks create a structural disconnect where students reproduce fluent linguistic strings without processing the structural logic or underlying premises. Participant S112 described this pedagogical breakdown, stating that they memorize vocabulary lists but rarely discuss implications or ambiguities in texts.

Theme 3 captured the digital paradox, showing a mixed impact from digital environments and short-form social media platforms. On one hand, digital media broadens exposure to global social commentary and diverse vocabularies; on the other hand, its rapid, truncated format reduces the cognitive attention span required to process syntactic complexity, irony, and deep semantic nuance, often leading to superficial textual analysis across cohorts. Finally, Theme 4 distinguished collaborative versus individual activities. The qualitative findings showed a clear preference for collaborative learning arrangements over solitary exercises. Cooperative dialogue and peer-to-peer discussions provide immediate, dynamic spaces where students can stress-test their ideas, adjust explanations in real-time, and practice cognitive perspective-taking.

## **4.5 Instructors' Approaches to Teaching Reasoning Through Language**

The third research objective explored the pedagogical frameworks and methods used by university faculty to develop verbal reasoning skills. Thematic analysis of the semi-structured interview data with 20 instructors revealed three primary instructional approaches, alongside significant institutional barriers. Instructors reported using a mix of traditional and interactive styles to build logical capacity within language frameworks.

### **4.5.1 Structural Pedagogical Approaches**

The first pedagogical approach, favored by 70% of instructors, focuses on Socratic and dialogic methods. This strategy features open-ended questioning, close text readings, and guided classroom debates designed to connect subtle linguistic choices directly to logical strength. The second approach, utilized by 65% of instructors, involves scaffolded writing assignments. This method leverages progressively scaled tasks—moving from purely descriptive writing to multi-perspective analysis—to build sustained cognitive endurance. The third approach, cited by 55% of instructors, involves explicit logic instruction. This strategy features direct instruction of formal and informal logic, classical syllogisms, informal fallacies, and rhetorical strategies within language courses.

### **4.5.2 Institutional and Environmental Bottlenecks**

Despite using these robust methods, instructors highlighted major institutional roadblocks that stall their efficacy, most notably large class sizes, rigid environmental or time constraints, and starkly varying levels of baseline academic preparedness among incoming undergraduate cohorts. Instructor I5 summarized the pedagogical bottleneck, stating that while they try to use close reading of texts followed by debates to help students connect linguistic choices to logical strength, maintaining individual dialogue becomes nearly impossible within current semester timelines in a lecture hall of over a hundred students.

## **CHAPTER FIVE: DISCUSSION, CONCLUSIONS, AND RECOMMENDATIONS**

### **5.1 Introduction**

This chapter provides a detailed discussion, analysis, and synthesis of the empirical findings presented in Chapter Four. The primary purpose of this study was to investigate linguistic reasoning skills at the university level and explore how communication habits and teaching practices shape these essential cognitive capacities. By interpreting the quantitative and qualitative data in relation to established educational, psychological, and sociological frameworks, this chapter contextualizes the study's findings within the wider body of academic literature.

The discussion is organized directly around the research objectives, followed by an exploration of theoretical and practical implications, structural limitations, and concrete recommendations for institutional policy and future research pathways. Ultimately, this chapter highlights the critical relationship between natural language processing and higher-order critical thinking in modern higher education.

### **5.2 Discussion**

#### **5.2.1 Evaluation of Baseline Reasoning and Disciplinary Gaps**

The finding that academic discipline significantly impacts linguistic reasoning proficiency matches broader empirical data from higher education settings. The higher average scores achieved by Humanities ( $M = 74.2$ ) and Social Science ( $M = 70.1$ ) cohorts stem from their curricula, which naturally emphasize dense textual analysis, verbal exploration, and argumentative writing, as supported by Kuhn (2019). These students regularly engage with linguistic ambiguity, nuance, and logic, preparing them well for verbal reasoning assessments like the Watson-Glaser elements.

In contrast, the lower average scores and wider internal variance ( $SD = 14.9$ ) among STEM students suggest a critical instructional gap. While STEM programs excel at teaching abstract mathematical, formulaic, or symbolic logic, they frequently overlook explicit training in verbal argumentation and textual logic. Consequently, a student can be highly proficient in symbolic

calculations yet struggle to evaluate structural logic when it is embedded in natural, ambiguous language.

### **5.2.2 Analysis of Operations and System Performance Gaps**

The strong positive correlation ( $r = .52$ ,  $p < .001$ ) between active language participation and objective reasoning capacity strongly supports Vygotsky's (1978/2012) socio-cultural theories of cognitive development. In a Vygotskian framework, language is not just an internal thought made vocal; it functions as an essential external tool that actively shapes and mediates higher-order cognitive processing. When students participate in debates or write analytical essays, they are not simply reporting finished thoughts—they are using language to construct the reasoning process itself.

The qualitative finding that passive, rote-heavy language tasks offer little cognitive benefit reinforces the principle established by Mercer and Littleton (2007) that exposure to words alone does not drive development. True cognitive growth requires deliberate, dialogic, and structurally reflective practice within interactive communicative environments.

### **5.2.3 Theoretical Interpretation of Cognitive Risk Pathways**

This study offers valuable real-world insights that extend the classical dual-process theories of cognition advanced by Evans and Stanovich (2013). Dual-process frameworks state that human reasoning relies on two distinct modes: System 1, which is rapid, automatic, and intuitive, and System 2, which is slow, analytical, and effortful. The findings of this research help explain how natural language mediates and triggers System 2 processing cycles.

Active and collaborative language activities—such as defending a point in a debate or addressing a peer's counterargument—disrupt intuitive System 1 responses. These activities force the brain to engage in the slow, conscious analysis characteristic of System 2 processing. Conversely, rote language drills do not trigger System 2 processing; they keep the brain reliant on simple System 1 memory retrieval loops. Additionally, this study contributes to modern discussions on linguistic relativity and cognitive development by showing that higher education academic tracks serve as specialized linguistic environments that directly shape how students process and analyze complex information.

### **5.2.4 Institutional, Structural, and Policy Enforcement Barriers**

The institutional obstacles documented in this research—specifically expanding class sizes, limited time, and weak baseline preparation—form an interconnected cycle of systemic failure. The limits faced by faculty confirm observations by Guerrero et al. (2013), who noted that many modern universities prioritize mass enrollment over the intensive, resource-heavy formats necessary to teach advanced logic and writing.

This structural shortfall directly undermines the pedagogical framework. Even though instructors see the benefits of Socratic and dialogic teaching, they cannot maintain them because they lack small seminar environments. This structural vacuum forces a reliance on passive, multiple-choice testing formats that measure low-level memorization rather than the deep cognitive synthesis required for real-world problem-solving.

## **5.3 Conclusions**

### **5.3.1 Level of Linguistic Reasoning Skills Among University Students**

The empirical analysis reveals that university students possess a moderate baseline level of linguistic reasoning capacity overall, but with a highly unequal distribution that is structurally dependent on their primary academic track. Students immersed in the Humanities and Social Sciences exhibit significantly stronger verbal reasoning, semantic processing, and textual logic due to the heavy interpretive demands of their curricula, aligning with observations by Kuhn (2019) regarding discipline-specific critical thinking tracks. Conversely, students in technical tracks like STEM demonstrate a distinct cognitive imbalance. Despite their advanced mastery of abstract symbolic or mathematical logic, they struggle significantly with evaluating argumentative validity, classical syllogisms, and structural dependencies when those arguments are embedded in natural, ambiguous language. Furthermore, demographic variables such as gender do not exert any statistically significant influence on these capabilities ( $p = .264$ ), confirming that the observed variance is driven primarily by specialized academic immersion rather than baseline demographic traits.

### **5.3.2 Present Language-Based Activities and Reasoning Development**

This investigation concludes that everyday communicative configurations play a dual, highly structural role in mediating undergraduate cognitive growth. Active, collaborative, and highly

dialogic language configurations—such as formal academic debates, peer-led seminars, and intensive analytical essay writing—exert a powerful positive influence on objective reasoning performance ( $r = .52, p < .001$ ). These active configurations function as essential tools that disrupt automatic, low-effort cognitive paths, forcing the brain to activate deliberate, analytical, and effortful reasoning loops as theorized in the dual-process frameworks of Evans and Stanovich (2013). Conversely, passive and isolated rote-driven language tasks—such as contextless vocabulary memorization, mechanical transcription of lecture slides, and isolated grammar drills—act as structural hindrances. These passive habits fail to engage higher-order mental processes, leaving students reliant on superficial memory loops without cultivating deeper conceptual or structural understanding, reinforcing the principle established by Mercer and Littleton (2007) that mere exposure to words alone does not drive higher-order cognitive development.

### **5.3.3 Instructors' Approaches to Teaching Reasoning Through Language**

The study concludes that while university faculty maintain a strong awareness of progressive, evidence-based language methodologies, there is a severe operational tension between pedagogical intent and institutional realities. Instructors successfully attempt to deploy a combination of Socratic questioning, scaffolded multi-perspective writing portfolios, and explicit instruction in informal logic fallacies to build logical capacity within language frameworks, matching the socio-cultural mediation paradigms of Vygotsky (1978/2012) where language is used to construct the reasoning process itself. However, the scalable efficacy of these interactive strategies is severely undermined by systemic institutional bottlenecks. As documented by Guerrero, Maas, and Hogland (2013), mass-enrollment pressures in modern higher education networks create deep pedagogical constraints. Expanding class sizes, rigid semester timelines, over-packed lecture halls, and weak baseline preparation among incoming undergraduate cohorts create an environment where individual dialogue and close textual critique become practically unfeasible, ultimately forcing higher education instruction to default back to passive, lecture-heavy formats and low-level rote testing methods.

## **5.4 Recommendations**

### **5.4.1 Immediate Operational and Infrastructure Interventions**

**Integrate Cross-Disciplinary Reasoning Modules:** University academic boards should dismantle traditional curricular silos by introducing mandatory, credit-bearing modules focused explicitly on natural language logic for STEM and Business cohorts. These modules should bridge the gap highlighted by Kuhn (2019) between technical, formulaic logic and the messy, nuanced verbal argumentation required in real-world professional contexts.

**Overhaul Assessment Blueprints and Exit Competencies:** Higher education institutions should shift away from a heavy reliance on passive, multiple-choice testing formats for general communication courses. Instead, universities should implement performance-based assessments—such as textual critique portfolios and logical synthesis tasks—and establish clear verbal reasoning benchmarks that undergraduates must fulfill at progressive stages of their academic lifecycles to ensure real-world problem-solving proficiency.

**Establish Targeted Diagnostic Screenings:** Academic divisions should design and administer standardized linguistic reasoning diagnostic assessments during freshman orientation. The data gathered from these screenings can be used to identify low-proficiency cohorts early, allowing departments to route them toward targeted academic literacy labs before disciplinary disparities widen.

### **5.4.2 Educational and Community-Based Strategies**

**Transition from Passive Drills to Active Dialogic Tasks:** Language and communication departments must significantly reduce instructional time spent on low-level, passive tasks like isolated grammar drills, mechanical copy-typing of lecture slides, and rote vocabulary memorization. These should be systematically replaced with high-engagement, active communication tasks—such as mock trials, structured parliamentary debates, and policy brief writing—that force students to actively manipulate syntax and evaluate evidence, thereby triggering slow, effortful cognitive cycles (Evans & Stanovich, 2013).

**Integrate Mandatory Reflective Learning Portfolios:** Undergraduate programs across all tracks should incorporate mandatory reflective portfolios. These portfolios should require students to regularly self-audit and document their practical language use (such as team-led discussions,

public presentations, and analytical essays) and explicitly map how those linguistic habits are advancing their higher-order mental processes, consistent with Mercer and Littleton's (2007) models of reflective dialogic practice.

**Mobilize Peer-Led Co-Curricular Logic and Debate Channels:** Faculty should actively sponsor and resource student-run debate societies, collaborative writing circles, and logic clubs outside the formal classroom structure. This provides dynamic, low-stakes environments where students can consistently practice cognitive perspective-taking, challenge peers' premises, and adjust arguments in real-time.

### **5.4.3 Policy, Regulatory, and Institutional Reforms**

**Mandate Small-Group Breakout Seminar Tracks:** To counteract the limitations imposed by massive class sizes, university administrations must adjust scheduling policies to supplement large lecture hall configurations with mandatory, small-group breakout seminars (restricted to 25–30 students). This structural change is vital to give instructors the intimate dialogic spaces necessary to facilitate genuine Socratic questioning and close text readings (Vygotsky, 1978/2012).

**Provide Continuous Professional Training in Scalable Pedagogy:** Institutional human resource and professional development divisions must invest in continuous training pathways for faculty. These workshops should equip instructors with evidence-based strategies to manage interactive, scaffolded writing techniques and peer-critique frameworks effectively within large-enrollment classrooms to bypass the mass-enrollment constraints outlined by Guerrero et al. (2013).

**Build Public-Private Academic Partnerships for Resource Mobilization:** University leadership should forge strategic alliances with educational non-governmental organizations (NGOs), international critical thinking networks, and alumni funds to secure external grants, modern pedagogical software, and instructional design resources. This external backing can help fund teaching assistant lines to alleviate the extreme grading and evaluation burdens currently stalling faculty scaffolding efforts.

## **5.5 Limitations of the Study**

**Reliance on Self-Reported Frequency Data:** The metrics for student engagement in language activities were gathered via self-reported questionnaires, which can introduce recall bias or subjective errors regarding daily habits.

Cross-Sectional Design Constraints: The research data collection represents a specific point in time, limiting the ability to track how a student's linguistic reasoning skills naturally evolve across a multi-year university lifecycle.

Geographical and Institutional Concentration: The field research was restricted to a single university sample, meaning the specific operational dynamics, disciplinary balances, and findings may not apply fully to alternative cultural or regional higher education landscapes.

## **5.6 Areas for Further Study**

Longitudinal Trajectories across Academic Cohorts: Future research should implement multi-year longitudinal designs that track specific undergraduate student streams from orientation through graduation to map how distinct specialized disciplines physically alter linguistic processing competencies over time.

Experimental Interventions on Dialogic Instruction: Controlled experimental designs are needed to quantify and compare the explicit cognitive efficacy of targeted interactive strategies, such as mapping the reasoning outcomes of a Socratic seminar track directly against a standard lecture framework.

Neuroimaging and Think-Aloud Syntactic Protocols: Integrating advanced cognitive neuroimaging (such as fMRI mapping during text evaluation) or utilizing real-time qualitative think-aloud protocols would offer critical, process-level insights into how student cohorts navigate semantic logic, ambiguity, and informal logical fallacies across varied socio-linguistic settings.

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## APPENDICES

### APPENDIX A: UNDERGRADUATE LINGUISTIC REASONING PERCEPTION QUESTIONNAIRE

Dear Student,

This survey is part of an ongoing research project exploring the development of linguistic reasoning and expert analytical reasoning skills at the university level. Your responses will remain strictly confidential, and data will only be reported in an anonymous, aggregated format. Thank you for your time and participation.

#### Section 1: Demographic Profile

1. Academic Faculty / Major Discipline:

☐ Faculty of Education & Humanities

☐ Faculty of Science / STEM

☐ Faculty of Business & Management

☐ Other (Please specify): \_\_\_\_\_

2. Current Year of Study:

☐ Year 1    ☐ Year 2    ☐ Year 3    ☐ Year 4 / Postgraduate

3. Gender Designation:

☐ Female    ☐ Male    ☐ Prefer not to say

#### Section 2: Engagement Frequency with Language-Based Tasks

Please check the box that best describes your regular engagement with the following academic activities:

| Academic Activity                 | Daily                    | Weekly                   | Monthly                  | Never                    |
|-----------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| Participating in formal classroom | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

|                                                                   |     |     |     |     |
|-------------------------------------------------------------------|-----|-----|-----|-----|
| debates or mock trials                                            |     |     |     |     |
| Writing long, analytical or argumentative academic essays         | [ ] | [ ] | [ ] | [ ] |
| Reading dense historical, philosophical, or scientific articles   | [ ] | [ ] | [ ] | [ ] |
| Working collaboratively in small groups to solve textual problems | [ ] | [ ] | [ ] | [ ] |

### Section 3: Self-Perceived Cognitive Obstacles

1. What do you consider your greatest bottleneck when parsing complex or ambiguous text passages?

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2. Do you believe that your secondary school background prepared you sufficiently for the analytical logic required in university communication course units?

[ ] Yes    [ ] No    [ ] Uncertain

## **APPENDIX B: SEMI-STRUCTURED INSTRUCTOR INTERVIEW GUIDE**

1. In your professional experience, what are the primary challenges or cognitive deficits undergraduate students display when attempting to deconstruct structural logical arguments in natural text formats?
2. How do mass-enrollment pressures, rising class sizes, and tight semester timelines affect your capacity to employ Socratic dialogue or scaffolding strategies in your language classes?
3. What concrete institutional reforms or policy alterations should your university enforce to ensure that graduates possess expert reasoning competencies?