A Study of Logical Reasoning Skills in Objective Type Questions among Post Graduate Students of Bharathiar University

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Abstract

Logical reasoning is crucial for understanding information , making informed judgments , and succeeding in academic and professional contexts , especially in competitive exams like UGC NET and CSIR NET . This study examined postgraduate students ' logical reasoning skills at Bharathiar University , comparing the performance of male and female students across arts and science disciplines . The questionnaire consisted of 50 multiple - choice questions based on assertions and reasoning that covered a wide range of topics , including life , culture , sports , news , general knowledge , opinion , social life , health , the environment, and education. The study employed a random sampling method and a quantitative approach , distributing the questionnaire via Google Forms to postgraduate students from the arts (English literature and linguistics) and science (mathematics , statistics, and data science) disciplines . The total number of participants was twenty students from each discipline . There were nine male and eleven female students in

the science discipline and six male and fourteen female students in the arts. Data were analyzed using percentage analysis. The science discipline had a higher overall success rate due to its structured curriculum and objective-based learning. The study concludes that logical reasoning is crucial for academic success and competitive exams. Despite gender differences in performance, both male and female students faced similar reasoning challenges, highlighting the need for improved teaching methods and targeted instruction to enhance logical reasoning skills.

Keywords: Logical Reasoning, Reasoning skill Development, Postgraduate Students, Gender Comparison, Competitive Exams.

INTRODUCTION

Logical reasoning is a component of reading comprehension that refers to the ability to analyze situations, statements, or arguments systematically to derive a logical conclusion based on the given evidence. It is the ability to examine, assess, and infer conclusions logically. It is application-oriented, aiding in decision-making and problem-solving in daily life, education, and professional fields. It helps to make informed decisions by considering facts, making connections, and also avoiding mistakes when making important decisions. According to Dewey (1910), logical reasoning is "the disciplined thinking that derives from sound and established principles, ensuring that conclusions follow necessarily from the premises." This emphasizes that logical reasoning is not based on guesswork or intuition but on structured and rational processes. Logical reasoning is a critical component of academic success, particularly in reading comprehension and decision-making (Dewey, 1910; Lipman, 2003). Logical reasoning is a component of reading comprehension, particularly in competitive exams, where students are required to connect ideas logically and critically assess assertions. It plays a critical role in competitive exams, where students encounter assertion-reasoning questions. Bhattacharyya (2009) highlights that "logical reasoning skills are essential in competitive exams, where students must assess the validity of statements and draw logical conclusions." In competitive exams, reasoning-based questions help assess a student's ability to apply logical thinking to solve complex problems. Logical reasoning and assertion-reasoning questions are part of Paper 1 UGC NET, which assesses candidates' teaching and research aptitude. Out of 50 questions in Paper 1, 5-8 questions are typically based on logical reasoning and may include assertion-reasoning formats. In Part A of the CSIR NET, around 2-3 assertion-reasoning questions are typically found, depending on the subject's syllabus and the pattern of that particular session. Logical reasoning questions often test critical thinking and analytical skills.

SIGNIFICANCE OF THE RESEARCH

The study emphasizes the importance of logical reasoning in reading comprehension, decision-making, and academic success, particularly in competitive exams. Logical reasoning helps students analyze situations, evaluate evidence, and make informed decisions, which is crucial in both academic and professional settings. The study highlights its role in competitive exams, such as UGC NET and CSIR NET, where students are required to critically assess assertions and solve complex problems. The findings aim to improve teaching practices and student performance, helping students develop better logical reasoning skills for academic and exam success.

REVIEW OF LITERATURE

Roland Hausser (2023) Logical Reasoning

The study examines the evolution of logical reasoning, starting with Aristotle's classical syllogisms and refined by medieval scholars, and how these ideas have influenced modern views, particularly set theory. It highlights a shift in logic understanding and its ongoing impact on modern thinking.

Bertrand Wong (2021) On Logical Reasoning in Everyday Affairs

The study emphasizes the significance of logical reasoning in daily life, highlighting its challenges due to fixed opinions and suggests using AI or logical tools for fair conflict resolution.

Hugo Bronkhorst, Gerrit Roorda, Cor Suhre & Martin Goedhart (2020) "Logical Reasoning in Formal and Everyday Reasoning Tasks"

The study investigates the reasoning strategies of 16-17-year-old secondary school students in formal and everyday tasks. Results show rule, analogy, and example-based reasoning are prevalent in formal contexts, while informal reasoning is more common. The study emphasizes the need for improved logical reasoning teaching.

David Kelley (2013) "The Art of Reasoning: An Introduction to Logic and Critical Thinking"

This paper is a practice-based learning approach that enhances students' understanding of logic and critical thinking by allowing them to analyze arguments and construct their own, thereby improving knowledge retention and critical thinking abilities.

AIM

- To identify the achievement in logical reasoning skills among postgraduate students of Bharathiar University and compare between male and female students.
- To compare logical reasoning skills between students from arts and science disciplines.

KEY THEORIES OF READING COMPREHENSION

1. Kintsch and Van Dijk's Model of Text Comprehension (Kintsch and Van Dijk ,1978)

This model proposes that comprehension involves constructing both a surface-level representation of the text and a deeper, more integrated understanding.

The reader builds meaning by connecting individual propositions within the text to form a coherent whole.

Application: In reasoning questions, students must connect assertions to broader concepts in the text. This deep processing involves inference and logical reasoning to determine the validity of assertions.

2. Critical Thinking Theory (Ennis, 1987)

Ennis's theory highlights the role of critical thinking in evaluating arguments and reasoning. Logical reasoning is a core component of critical thinking, enabling students to assess the validity of assertions and reasons.

Application: Students critically evaluate whether the reason presented in an assertion-reasoning question logically supports the assertion, identifying any gaps in reasoning.

UGC NET TESTING SYSTEM - PAPER 1

The UGC NET (National Eligibility Test) Paper 1 is designed to assess the teaching and research aptitude of candidates. It consists of objective-type multiple-choice questions.

Component	Subtopic	Key Focus
Logical Reasoning	- Analytical reasoning - Verbal and non-verbal reasoning - Patterns, analogies, classifications, logical sequences - **Statement-conclusion-based questions** - Syllogisms, coding-decoding, series completion, data interpretation	Evaluates critical thinking, reasoning, and logical analysis skills.

ASSERTION AND REASONING METHOD IN READING COMPREHENSION

An assertion is a statement that expresses a fact, opinion, or belief. It is what is being declared as true or valid. A reason provides the explanation or justification for why the assertion is true. It supports the assertion with logic, evidence, or cause-and-effect reasoning. The connection between assertion and reason lies in the logical relationship that evaluates the validity of a claim (assertion) based on the justification provided (reason). In assertion-reason type questions, a statement (assertion) is given along with a supporting or explanatory statement (reason). The assertion and reasoning method is commonly used in competitive exams to test students' logical reasoning.

Ex:

Assertion: "Birds can fly."(This is the claim or fact being stated.)

Reason: "Birds have lightweight bodies and wings adapted for flight."(This explains why the

assertion is true by providing a biological and physical reason.)

In this example, the assertion states a general truth, while the reason gives the supporting logic or explanation behind it.

TYPES OF LOGICAL REASONING

The two types of logical reasoning are

- Deductive Reasoning
- Inductive Reasoning

DEDUCTIVE REASONING

Deductive reasoning, or deductive logic, derives a logically certain conclusion from general premises by following strict logical rules. It contrasts with inductive reasoning, which moves from specific observations to general conclusions. If the premises are true and logic is correctly applied, the conclusion must also be true.

For example:

All men are mortal.

Socrates is a man.

Therefore, Socrates is mortal.

This illustrates how deductive reasoning ensures logical consistency and accuracy by linking premises to conclusions.

INDUCTIVE REASONING

Inductive reasoning, or induction, is a reasoning process that derives general principles from specific observations. Unlike deductive reasoning, which moves from general premises to a certain conclusion, inductive reasoning infers general rules based on specific instances.

For example:

90% of humans are right-handed.

Ratan is a human.

Therefore, Ratan has a 90% probability of being right-handed.

SELECTION OF INFORMANTS

The study employed a quantitative approach, collecting data through a questionnaire. The informants consisted of postgraduate students enrolled at Bharathiar University.

PREPARATION OF QUESTIONNAIRE

The questionnaire included 50 assertion and reasoning oriented multiple-choice questions covering various domains such as life, culture, sports, news, general knowledge, opinion, social life, health, environment, and education.

COLLECTION OF DATA

The study uses a random sampling method. The questionnaire was sent to the students using Google Form to collect data from postgraduate students of various departments in Bharathiar University belonging to the arts and science disciplines.

The arts discipline included students from the Departments of English and Linguistics, while the science discipline comprised students from Mathematics, Statistics, and Data Science. A total of 20 students participated from each discipline. In the arts discipline, there were 6 male and 14 female students, while in the science discipline, there were 9 male and 11 female students.

DATA ANALYSIS

Percentage analysis was used to analyze the data.

PERFORMANCE OF ARTS & SCIENCE STUDENTS

Category	Arts			Science		
	Male	Female	Total	Male	Female	Total
Life Skills	64(29.9%)	150(70.1%)	214(53.5%)	91(39.91%)	137(60.09%)	228(57%)
Education	98(31.3%)	215(68.7%)	313(52%)	117(37%)	200(63%)	317(52.8%)
Average	162(30.75%)	365(69.25%)	527(52.7%)	208(38.1%)	337(61.9%)	545(54.5%)

The table shows how responses are divided by gender in two main sections: life skills and education. The Life Skills section includes questions on life, social life, opinions, and culture, while the Education section covers topics like news, sports, education, general knowledge, health, and the environment. Female students answered more questions correctly than male students in both the Life Skills and Education sections. In the arts stream, females got 69.25% of the answers correct, while males got 30.75%. In the science stream, females answered 61.9% of the questions correctly, and males answered 38.1% correctly. Overall, students in the science stream did better, with 54.5% correct answers, compared to 52.7% in the arts stream.

FINDINGS AND RESULT

Female students answered more questions correctly than male students. In the arts stream, females got 69.25% of the answers correct, while males got 30.75%. In the science stream, females answered 61.9% of the questions correctly, while males answered 38.1%. This shows that females generally performed better in both streams.

When comparing the total performance between the arts and science streams, the science stream had a higher percentage of correct answers (54.5%) than the arts stream (52.7%).

This indicates that overall, students in the science stream performed better, although the difference is not very large.

The science curriculum is more structured, with objective-based questions, reasoning, and calculations, which are easier to assess, leading to better performance. Science subjects focus on factual knowledge and problem-solving, which may be easier for students who excel in logical reasoning, while arts subjects are more subjective. Although female students performed better, both genders made many mistakes in the Life skills and Education sections.

The study concludes that logical reasoning is crucial for academic success and success in competitive exams. It shows a clear difference between life skills and educational knowledge. Life skills are used directly in real-life situations, while education provides theoretical and conceptual knowledge that may not always be practical. Logical reasoning is essential for higher studies and exams like Junior Research Fellowships. However, the study found that many students, especially those from arts backgrounds, face difficulties with assertion and reasoning questions because they struggle to understand and apply them. The difficulties faced by students in these areas suggest that better teaching methods are required to help them understand and effectively apply logical reasoning. This highlights the need for more practice and focused teaching in logical reasoning to help students improve their skills.

SUGGESTIONS

- Future studies can explore the development of reasoning skills in school students, focusing on enhancing their basic understanding, lexical and grammatical abilities, and conceptual clarity to build a strong foundation for logical reasoning.

- Include more logical reasoning tasks and assertion-reasoning questions in regular lessons to help students practice these skills.

- Organize workshops focused on logical reasoning, problem-solving, and critical thinking to give students hands-on practice.

- Use educational apps and online platforms to offer interactive exercises and quizzes that strengthen reasoning skills.

- Encourage students to regularly practice logical reasoning tasks to improve their skills.

- Engage students in activities like puzzles and brainteasers to develop their critical thinking and reasoning abilities.

- Promote discussions and debates that help students to analyze different viewpoints and improve their logical reasoning.

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