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Mathematical Intuition - An Exploratory Study on the Stances of Mathematicians

ABSTRACT

This dissertation investigates the debates and understanding of mathematical intuition (M.I). Rooted in the intersection of mathematics and philosophy, this research aims to explain the contemporary opinions of mathematicians regarding mathematical intuition (M.I) and categorize these opinions into distinct schools of thought.

The study is motivated by the recent educational reforms in India, specifically the National Curriculum Framework for School Education 2023 (NCF SE, 2023) and the National Education Policy 2020 (NEP-2020), which emphasize the importance of developing mathematical intuition (M.I) in students.

The research questions guiding this study are:

- What are the contemporary opinions among mathematicians about mathematical intuition?
- Into what schools of thought can the existing debates be categorized?

The objectives of this research include exploring contemporary opinions among mathematicians about M.I through a comprehensive literature review and categorizing these opinions into various schools of thought.

The research adopts an exploratory design within the paradigm of interpretivism, focusing on the philosophical underpinnings of M.I as articulated by mathematicians who have engaged with philosophical debates. A qualitative approach is employed, primarily through the review of related literature from the peak periods of discussion on the philosophical aspects of mathematics.

The study covers in detail the works by Richard Tieszen, R.L. Wilder, Penelope Maddy, and Carl J. Posy, among others. Tieszen's phenomenological approach, Wilder's perspectives on individual and collective intuition, Maddy's insights into the role of perception in mathematical understanding, and Posy's detailed account of mathematical intuitionism provide a comprehensive backdrop for this study.

Key findings from the literature indicate that mathematical intuition is perceived variably across different philosophical traditions. The understanding about intuition can be broadly categorized in two distinct schools of thoughts. This distinction is due to the nature of truth as these scholars understand. The nature of truth can be categorized as follows: -

1. Absolute, causally inert
2. Dynamic, changing.

Gödel, Hilbert, Maddy, etc. regard the first, and therefore, in their arguments, Mathematical Intuition serves as a source of mathematical knowledge, emanating from an *a priori* knowledge.

L.E.J. Brouwer, Carl. Posy, etc. regard the second one, therefore, they position Intuition as a human cognitive capacity, which is enriched with Mathematical knowledge.

The study delimits itself to the works of mathematicians who have contributed to the philosophical debate on mathematics, excluding detailed exploration of intuition as a purely cognitive function. In the end, reflections by the author based on the exploration are added as an essential note.

In conclusion, this dissertation aims to provide a rich, nuanced understanding of mathematical intuition, its philosophical underpinnings.

Keywords:- Mathematical Intuition, Intuitionist, Formalist, Realist, Mathematical Knowledge

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