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FACULTY OF EDUCATION

THESIS EXAMINATION

Krishna Prasad Subedi

FOR THE DEGREE OF

DOCTOR OF PHILOSOPHY

Friday, August 8, 2014
SFU Burnaby, EDB 9511 at 10:00 am

EXAMINING COMMITTEE

Chair: Dr. David Pimm
Senior Supervisor: Dr. Rina Zazkis
Member: Dr. Nathalie Sinclair
Internal/External: Dr. Stephen Campbell
External Examiner: Dr. Viktor Freiman, Moncton University
Dealing With Abstraction: Reducing Abstraction in Teaching (RAiT)

ABSTRACT

One of the most important challenges for mathematics teachers involves dealing with mathematical abstraction, specifically; figuring out efficient ways to translate abstract concepts into more easily understandable ideas for their students. Reducing abstraction is one of the theoretical frameworks originally proposed by Hazzan (1991) to examine how learners deal with mathematical abstraction while working with new mathematical tasks or concepts. However, very little is known about how teachers deal with mathematical abstraction while implementing mathematical tasks in the classroom. To complement this body of research, my study seeks to understand the features of teaching practices in real classroom situations with regard to dealing with mathematical abstraction.

In this study, the level of abstraction involved in a situation has been interpreted from three distinct perspectives: 1) as the quality of the relationships between the mathematical concept and the learner; 2) as a reflection of the process-object duality; and 3) as the degree of complexity of a mathematical task or concept. Upon close analysis of the primary (classrooms observation) and secondary (TIMSS 1999 Public Release video lessons) data, various behaviours and strategies used by teachers to reduce abstraction while implementing tasks have been identified in each of the above three categories. As a result, a framework of “Reducing Abstraction In Teaching” (RAiT) has emerged, thus offering a new perspective on and an application of the notion of reducing abstraction.

While reducing abstraction in teaching is often intended to make the mathematical concept or object more accessible to students and, thus, to achieve meaningful learning, this study exemplified some instances in which RAiT activity may not necessarily be supportive for that purpose. Hence, this study suggests a need for teachers to pay attention to the possible deficiencies of students’ understanding that may arise as a consequence of some of the strategies of reducing abstraction in teaching. Finally, the study concludes with a number of recommendations and suggestions, including avenues for future research.

Academic Record

Doctor of Philosophy – Mathematics Education, Simon Fraser University

Dissertation – Dealing With Abstraction: Reducing Abstraction in Teaching (RAiT)

Master of Education – Endicott College, Massachusetts

Thesis – Vedic Mathematics: Students attitude and its effects on their achievement, self-efficacy and mental computation

Master of Arts – Mathematics, Tribhuvan University, Kathmandu, Nepal

Bachelor of Arts – Mathematics & Economics, Tribhuvan University, Kathmandu, Nepal

Bachelor of Management – Tribhuvan University, Kathmandu, Nepal

Awards

2013 Travel & Minor Research Award, Simon Fraser University

2011- 2012 Graduate Fellowship, Simon Fraser University,

2002- 2004 Full Tuition Scholarship, Endicott College