

**A STUDY OF THE UNDERSTANDING AND USE OF MATHEMATICAL  
CONCEPTS BY SECONDARY SCHOOL TEACHERS OF PHYSICS: THE  
CASE OF SELECTED SCHOOLS IN LUSAKA.**

**BY**

**JAMES KABWITA**

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Master of Education in Science Education.**

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## DECLARATION

I *James Kabwita* hereby declare that this dissertation is my own work and that it has not been previously submitted for a degree at this or any other University.

**CERTIFICATE OF APPROVAL**

This dissertation by *James Kabwita* is approved as a fulfillment of the award of the degree of Master of Education in Science Education by the University of Zambia.

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## **DEDICATION**

I dedicate this work to my late mother, Norah Yosa Kabwita; her life always inspired me to do greater things. Thank you mother, you were my hero.

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## ABSTRACT

Throughout the study of physics, mathematical related terms, facts, figures and concepts are learned. Although the relationship between mathematics and physics is evident and interwoven, no studies of Zambian origin have focused on how mathematical concepts should be understood and used by physics teachers in secondary schools. This situation indicates a gap in knowledge which calls for systematic investigation. The purpose of this study was to investigate the understanding and use of mathematical concepts by teachers of physics in teaching physics at secondary school.

The participants of this study included 250 male and female secondary school learners aged between 15 and 25 who were in Grade 10, 11 and 12 in 2011. The study also included 25 teachers of physics. The methods used to collect data in this study included questionnaires, interviews, examination analysis, analysis of documents and diaries as well as observations.

The research findings suggested that the majority of the teachers of physics used mathematical concepts in one physics lesson every two weeks. Their inadequate knowledge in the understanding of mathematical concepts prevented them from using them. This frequency was low though teachers used the concepts. The lesson observation revealed that the teachers of physics used methods which failed to reflect mathematical concepts as most of the lesson objectives were of low cognitive domain.

It was recommended that teachers of physics should use methodologies of teaching that promote acquisition of the ability to understand and use mathematical concepts which allow learners to use and understand mathematical concepts. The ministry of education, science, vocational training and early education (MoESVTEE) should draw up a curriculum that emphasizes methodologies of teaching particularly in the use and understanding of mathematical concepts in science rather than in physics content only. Curricula in colleges, and universities should also be restructured so that they teach pre-service and in-service teachers methodologies that are in line with problem – solving approaches, which lead to a proper understanding and use of mathematical concepts in physics.

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**LIST OF ABBREVIATIONS**

C PD	Continuous Professional Development
ECZ	Examinations Council of Zambia
FETVC	Free Education Television Channel
FGDs	Focus Group Discussions
GCE	General Certificate of Education
IN-SET	In - Services Training
Kg	Kilogram
MoE	Ministry of Education
MoESVVEE	Ministry of Education Science, Vocational Training and Early Education
mksa	Meter, Kilogram, Second and Ampere
N.B	Take note

NGOs	Non-Government Organizations
O-level	Ordinary level
UNZA	University of Zambia
ZASE	Zambia Association for Science Educator