

# Influence of Problem Solving Approach on Secondary School Students' Mathematics Achievement by School Type in Vihiga County, Kenya

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**Abstract-** In Kenya, the fundamental challenge facing learning of mathematics in secondary schools is how to enhance students' conceptual understanding associated with the learning process. Based on this challenge, the study investigated the influence of using Problem Solving Approach on secondary school students' mathematics achievement by school type. The purpose of this study was to determine whether the use of Problem Solving Approach had any influence on students' mathematics achievement by school type. Students from one hundred and nine schools from Vihiga County formed the population of the study. Stratified random sampling was used to select twelve schools from the 109 schools. The population of the study was 1459 Form Three students selected from the twelve schools that participated in the study. The sample size of 727 students was selected from the 109 schools by the use of purposive and simple random sampling techniques. The Solomon Four-Group design was used in the study. The respondents were assigned in their intact classes to four groups; experimental groups 1 and 3, and control groups 2 and 4. All the groups were taught the same content of the topic Commercial Arithmetic. However, groups 1 and 3 were taught using Problem Solving Approach while groups 2 and 4 were taught by conventional methods. Groups 1 and 2 were pre-tested prior to the implementation of the Problem Solving Approach treatment. Mathematics Achievement Test 1 and Mathematics Achievement Test 2 were used to collect data. The instruments' validity was determined by the researcher, a panel of mathematics educators from the Department of Science and Mathematics Education at Masinde Muliro University of Science and Technology and experienced secondary school mathematics teachers. Reliability coefficients of 0.795 and 0.872 were obtained for Mathematics Achievement Test 1 and Mathematics Achievement Test 2 respectively using Cronbach's Coefficient alpha formula. After the treatment, all the four groups were post-tested. The results showed that increased students' learning occurred among students in the three types of schools and more significantly in the County schools in comparison to the National and Sub-county schools when Problem Solving Approach was used. The study concluded that Problem Solving Approach is a more effective teaching approach to the students in the County schools in comparison to those in the National and Sub-county schools. Therefore, mathematics educators should encourage mathematics teachers to use it and

teacher educators to make it part of the teacher-training curriculum.

**Index Terms-** Problem Solving Approach, Secondary School, Mathematics Achievement, School Type.

## I. INTRODUCTION

**M**athematics is one of the core subjects in the Kenya secondary school curriculum. It is an examinable subject for all students (Kenya Institute of Education [KIE], 2006). Much importance is currently attached to it by the society. As a tool, it finds its application in daily lives at home, in the office and in scientific and technological fields. Despite its importance, students have consistently performed poorly in the subject. This is evident from the Kenya Certificate of Secondary Education (KCSE) examination results. The years 2006, 2007, 2008 and 2009 recorded low mean scores of 38.08, 39.46, 42.59 and 42.26 respectively (KNEC, 2010). The mean score figures indicate that there was a slight decline in the overall mean score in the year 2009 compared to the previous year. However, the general performance in the subject is poor as depicted by the low mean scores. This poor performance was attributed to poor teaching and/or learning strategies (KNEC, 2009).

In the recent past, teaching and learning practices have undergone changes of revolutionary proportions; changes underpinned by shifts in psychological and pedagogical theory in teaching and learning process. The new developments advocates for new approaches to mathematics teaching and learning, not only in secondary schools but also in teacher education (Okigbo & Osuafor, 2008). Research findings on learning and memory show that for learning to be effective, the learner should be actively involved in the learning process (Lambros, 2002). Piaget believed that there is no true learning unless the students mentally act on information and in the process, assimilate or accommodate what they encounter in their environment. Unless this assimilation occurs, teachers and students are involved in pseudo-learning, which is knowledge retained only for short time. Efforts made to translate these new conceptions of learning into classroom practices include development of instructional methods that engage the learner actively in the process of

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