EFFECTS OF SCIENCE PROCESS SKILLS TEACHING APPROACH ON SECONDARY SCHOOL STUDENTS’ ACHIEVEMENT IN CHEMISTRY, NYANDO DISTRICT, KENYA

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A Thesis Submitted to the Board of Postgraduate Studies in Partial Fulfillment of the Requirements for the Doctor of Philosophy Degree in Science Education of Egerton University

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DECLARATION AND RECOMMENDATION

DECLARATION

This thesis is my original work and has not been presented for a degree, diploma or other awards in this or any other university.

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RECOMMENDATION

This thesis has been submitted for examination with our approval as University Supervisors

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DEDICATION

This work is dedicated to my wife Risper A. Odhiambo and my youngest daughter Pauline Akinyi Abungu.
I am deeply indebted to all those people who assisted me in the preparation of this thesis. Special thanks go to the following:

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Science education is crucial for the understanding of our environment and an essential tool for technological development in any society. Hence nations all over the world continue to ensure that the teaching of science subjects should be done in a manner that enhances the achievement of intended objectives. Science process skills are central to the acquisition of scientific knowledge which is useful in solving achievement in Kenya Certificate of Secondary Education (KCSE) Chemistry is poor. The poor performance could probably be attributed to lack of exposure to science process skills, which may affect students’ achievement in chemistry. This study was intended to investigate the effect of the science process skills teaching approach (SPSTA) on students’ achievement in chemistry. It was also intended to find out the effect of gender and group composition on students’ self-concept in chemistry when they taught using SPSTA. The study involved quasi-experimental research where the Solomon Four-Group Non Equivalent Control Group Design was employed. The target population consisted of students in the secondary schools in Nyando District. Purposive sampling was used to obtain four district secondary schools in Nyando District to ensure that the number of boys and girls in each school was about the same. The samples consisted of 153 Form Three students drawn from four district secondary schools located in Nyando District. The Form Three classes were randomly assigned to the experimental and control groups. The study covered two topics selected from the KCSE Chemistry syllabus, that is, Volumetric analysis (Titration) and Qualitative analysis knowledge on the selected topics and chemistry self-concept, Chemistry Achievement Test (CAT) consisting of calculations, True and False items, Fill in blanks and SSCS questionnaire were used as pre-test. After the administration of treatment, which lasted five weeks, the same test (CAT) was administered to the four groups as post-test. Students’ Self-Concept Scale (SSCS) questionnaire was also used to measure student-concept. The CAT and SSCS were adapted from the KCSE Chemistry practical past papers and Self-Descriptive Questionnaire II (SDQ) scale respectively. The reliabilities of the CAT and SSCS were estimated using Kuder-Richardson (K-R21) and Cronbach’s a formulae respectively. The reliability coefficient of 0.88 (CAT) and 0.95 (SSCS) were established for the instruments and indeed were accepted as suitable. The instruments were validated by experts from science education and psychology areas of specialisation. The data generated were analyzed using descriptive statistics, t-test, ANOVA, ANCOVA, Pearson correlation coefficient and Multiple Regression. The level of significance for acceptance and rejection of the hypotheses was at $\alpha = 0.05$. The results revealed that SPSTA had a significant effect on students’ achievement in chemistry. However, gender and group composition had no significant effect on students’ self-concept in chemistry. The outcome of this study may provide an insight for designing instructional strategies that aim to enhance students’ performance and contribution to the improvement of teaching and learning of Chemistry in secondary schools in Kenya. This will be shown by achievements made by the students in practical activities. It is expected that the findings of the study may be used by Kenya Institute of Education, Education Adm Officers, who are major stakeholders of the Ministry of Education to re-examine the instructional methodologies of teaching chemistry in the secondary school curriculum.
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