

**EFFECTS OF TEACHING USING A DANCE ANALOGY ON PHYSICS STUDENTS'  
MOTIVATION, SELF-CONCEPT AND CONCEPTUALIZATION OF HEAT  
CONCEPTS IN SECONDARY SCHOOLS IN NYANDARUA COUNTY, KENYA**

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**A Research Thesis Submitted to the Graduate School in Partial Fulfilment of the  
Requirements for the Conferment of the Degree of Doctor of Philosophy in  
Science Education of Laikipia University.**

**LAIKIPIA UNIVERSITY,**

**OCTOBER, 2014.**

## ABSTRACT

An important component of science learning is mastery of scientific concepts. The topic of heat forms an important part of the science curriculum at all levels in the Kenyan education system. Explanation of heat concepts requires understanding of kinetic theory of matter. The theory deals with the behaviour of sub-microscopic particles of matter. This abstractness of the theory presents difficulties in its teaching and learning in secondary schools. As a result, students have developed misconceptions on physical heat concepts and an unfavourable attitude towards learning of the concepts. Teaching using analogies has been found useful in concept learning in science. However the factor of students' socio-cultural knowledge as the basis for selecting and designing the analogies has not received adequate attention. There is also paucity of literature on the effect of analogy teaching on students' self-concept of scientific concepts. This study set out to investigate the effect of teaching kinetic theory of matter using a 'dance' analogy on students' motivation, self-concept and conceptualization of physical phenomena associated with heat. Data were collected from Form 1 students in 4 co-educational public secondary schools in Nyandarua County. A Heat Concepts Test (HCT) and a Students' Motivation Questionnaire (SMQ) were used to collect the data. Purposive sampling technique was used to identify the Form 1 classes to participate in the study which were randomly assigned to the four design groups of the Solomon Four Non-equivalent Control Group design adopted by the study. The instruments were pilot-tested to assess their reliability and construct validity in 2 co-educational public schools in Nyandarua County. Reliability of the HCT was estimated using the alternate forms technique while that of the SMQ was estimated using the split-half technique. The reliability coefficients were computed using Pearson's product-moment correlation. The reliability coefficients obtained were above the 0.7 level required for social science research. Data were analysed using student's t-test and Analysis of Variance (ANOVA). Hypotheses were tested at  $\alpha = 0.05$  level of significance. Results obtained indicated that teaching kinetic theory of matter using the dance analogy produced significantly better conceptualization, motivation and self-concept and reduced more students' misconceptions of physical phenomena associated with heat compared to teaching using conventional instructional techniques. Based on the findings, the study recommends that teachers should often use analogies to teach abstract scientific concepts and in so doing consider students' socio-cultural knowledge as the basis for selecting and designing the analogies. The study recommends further research to establish ways in which analogy teaching could be integrated within other pedagogical models of teaching science.