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The Effect of Small-Scale Chemistry Experimentation on Undergraduate Students' Chemistry Achievement, Attitude and Motivation

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Practical work is an established part of courses in chemistry in higher education. However, laboratory applications have generally been neglected in recent educational environments for a variety of reasons including cost, safety, time, and teachers' skill and motivation issues. Small scale chemistry (SSC) might be used as one means of overcoming the barriers, practical work being conducted using significantly reduced quantities of chemicals and miniature of equipment. This study examined the effect of small-scale chemistry (SSC) experimentation approach on undergraduate students' chemistry achievement, attitude and motivation. For this purpose eight experiments from a practical general chemistry course were modified to the small-scale approach for use with the MyLab kits (MyLab project, Northwest University, South Africa) in the first semester of the 2013/2014 academic year. The sample of the study consisted of 101 (experimental = 49, control = 52) year I, undergraduate students and their teachers from the Department of chemistry, Mekelle University, Ethiopia. The students in the experimental group used the small-scale chemistry kits and manuals to perform the eight experiments while the students in the control group used the regular 'traditional' macroscale approach to perform the same experiments. The two groups conducted the experiments for a period of about two months. Study data were gathered with pre and post practical general chemistry test, questionnaires and interviews. The quantitative data collected were analyzed using SPSS (version 16.0). Comparison were made between the experimental and control groups. Findings show that the small-scale chemistry experimentation approach is at least as effective as that of the traditional macroscale approach, both in terms of students' chemistry achievement, and attitude and motivation. Teacher and students' perceptions towards the small-scale chemistry approach were also positive.