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## **STEAM-BASED BASIC SCIENCE INSTRUCTION: EFFECTS ON SELF-EFFICACY AND ACHIEVEMENT OF JUNIOR SECONDARY STUDENTS IN ABUJA**

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### **Abstract**

*This study examined the effects of a STEAM (Science, Technology, Engineering, Arts, and Mathematics) instructional approach on students' self-efficacy and academic achievement in Basic Science in the Federal Capital Territory (FCT), Abuja, Nigeria. A quasi-experimental, non-randomized control group design was adopted. The population comprised all junior secondary school students in Abuja Municipal Area Council (AMAC), with a sample of 97 students drawn from two intact classes through purposive sampling from two schools in the area council. Data*

were collected using the Basic Science Self-Efficacy Scale (BSSES) and the Basic Science Achievement Test (BSAT). The BSSES yielded a Cronbach's alpha reliability coefficient of 0.78, while the BSAT produced a Kuder–Richardson (KR-20) coefficient of 0.86, indicating satisfactory internal consistency. Data were analyzed using mean, standard deviation, Mann–Whitney U test, Analysis of Covariance (ANCOVA), and regression analysis. Findings revealed statistically significant differences in favor of the STEAM group in both self-efficacy and academic achievement ( $p < .05$ ). Effect sizes were substantial, with a very large effect for self-efficacy ( $r = .865$ ) and academic achievement (partial  $\eta^2 = .690$ ). Regression analysis further indicated that instructional method significantly predicted the post-test outcomes, whereas gender and pre-test scores were not significant predictors. The study concludes that the STEAM instructional approach significantly enhances both cognitive and affective outcomes in Basic Science, independent of gender differences. It is recommended that Basic Science teachers adopt STEAM-based strategies in classroom practice and that curriculum planners integrate structured STEAM components into the junior secondary curriculum to promote holistic student development.

**Keywords:**

STEAM Education, Basic Science Education, Self-Efficacy, Academic Achievement