The effect of pedagogy informed by constructivism: A comparison of student achievement across constructivist and traditional classroom environments

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Abstract

Implicit in the call for educational reform in the teaching of science has been the suggestion that pursuing constructivist principles in science teaching will lead to improvement in student achievement. (Rutherford & Ahlgren, 1990; National Research Council, 1995; NSTA, 1992). The purpose of this study was to compare the effectiveness of two types of pedagogy; didactic/traditional and constructivist-informed pedagogy on student achievement. Secondly, this study examined the relationship between students' and teachers' perception of constructivism in classroom environments. A nonequivalent control group pretest-posttest and delayed posttest quasi-experimental design was used in this study. Subjects involved in this study included two teachers and their respective students from a suburban public school district in the South. The sample consisted of two groups, one taught by traditional/didactic instruction (n = 25) and the other taught by constructivist informed pedagogy (n = 26). Data for this study was collected using the Constructivist Learning Environmental Survey, The Science Classroom Observation Rubric, the Teaching Practices Assessment, and a demographic survey. Ancillary data was collected with the Student Outcome Assessment and interpretive methodologies. The analysis of covariance (ANCOVA) ($p < .05$; pretest as covariate) was used to measure the effects of constructivist informed and traditional pedagogy on student achievement. Student achievement was measured with a researcher-designed pretest, posttest, and delayed posttest. A significance difference was found on the science achievement posttest where the students receiving the traditional pedagogy scored higher than the students taught by the constructivist pedagogy. However, the scores of students receiving constructivist-informed pedagogy showed a slight increase on the delayed posttest, while the traditionally taught students' scores decreased, thus the difference in the achievement of the two groups was diminished over time. A repeated measures ANOVA was used to analyze the ancillary data from the Student Outcome Assessment. ($p < .05$) Among 51 students tested, those who received the constructivist informed pedagogy had higher retention, approaching significance of the biology concepts tested over time. Ancillary data was used to assist the interpretation of the assessment measurements. Using ratios of students' and teachers' scores of perceived constructivist attributes in their classroom appeared to be an effective way for teachers to compare student perceptions with their own.

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