

Preparing Elementary Science Educators For Diverse Environments

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One factor in training future teachers that should be considered is the growing diversity of the K-12 student population. The University of Michigan-Dearborn (UM-D), situated in the diverse Detroit metropolitan area, considered this in revising its K-8 science education curriculum. A science education program was designed that includes six integrated courses connecting science content while modeling constructivist pedagogy. In creating our new program, consideration was given to the demands for accountability placed on K-8 science teachers. In Michigan, teachers are expected to follow the science benchmarks articulated in the *Michigan Curriculum Framework for Science (MCF-S)* (Michigan Department of Education, 2000). The design for the science benchmarks in *MCF-S* was based on the *NSES* (National Research Council, 1996). Both *MCF-S* and *NSES* prescribe not only *what* should be taught, but also *how* it should be taught. Thus, our program revision had to be centered on science content linked to the *MCF-S* and constructivist pedagogy.

We view constructivist learning as appropriate for our pre-service teachers since it is centered on the student and his/her construction of knowledge, and optimally respects the different experiences students bring to the classroom. Our belief that constructivist pedagogy is appropriate for diverse audiences is based upon a limited research base; there are specific research findings that demonstrate its effectiveness with students from ethnically and linguistically diverse cultures (Norman, et al, 1998; Von Secker, 2002; Warren, et al; 2001).

The guiding premise of evaluation is our belief that students' understanding of the science content and their sense of efficacy are closely interconnected and support their pedagogy in the classroom. We are in the initial stages of evaluating program impact on students' science knowledge, efficacy towards teaching science and science teaching behavior (Michigan Department of Education, 2000; Enochs & Riggs, 1990; Pilburn & Sawada, 2000). As a group, all of our students increased their content knowledge ($p=.000$) and efficacy towards teaching science ($p=.000$). Analysis focusing on the diversity of our population reveals that approximately 22% of our students are of minority status (7% non-white, 15% various Middle Eastern ethnicities) and 50% are older than 25. When assessed as seniors, our minority students possess less content knowledge ($p=.001$); yet the content gain scores for both sets of students are the same. Age of students has no effect upon content knowledge or efficacy. Why groups of students differ in levels of content knowledge than is something that needs to be investigated. Perhaps our program impacts sub-populations differently. Our program is still too new to evaluate teaching behavior.

References

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