Action Research Project Summary

Will the inclusion of forensics within the seventh grade gifted science curriculum enhance the students' motivation toward science as well as their critical thinking skills?

Problem/Rationale

Students at Riviera Middle School have typically exhibited a lack of motivation toward science as well as difficulties in engaging in the problem solving and critical thinking skills demanded of this subject. Past Science FCAT scores have indicated deficiencies within the Scientific Thinking strand of the Sunshine State Standards. These observations may be due in part to the lack of a hands-on, inquiry-based approach to science and the failure to provide enough real-world practical applications within the science curriculum.

In addition to this, advanced science students are faced with the challenge of learning the content of three years of Middle School Comprehensive Science in two years since they take Earth and Space Science as their eighth-grade science course. As a result of this, this group of students typically misses out on several key concepts that have been incorporated into the traditional eighth-grade science curriculum.

As a science instructor, I was looking for ways to provide my students with opportunities to experience some of these key concepts while enhancing their motivation and critical thinking skills at the same time. It was my belief that the infusion of forensics into the science curriculum would be an ideal method of achieving this goal.

Forensic science incorporates key principles of Biology, Chemistry, and Physics. In order to "solve crimes," students must be aware of the scientific principles involved. The opportunity to be the first to solve a mystery or to outsmart classmates provides the reinforcement needed to motivate students toward success. The continuous application of the scientific method to real-life crime situations requires students to collect, report, and analyze data and to then draw conclusions. The problem solving strategies utilized in this process requires students to think logically and critically. Therefore, as a result of this project, I felt as if students would gain a greater understanding of the entire scientific process in addition to the myriad of concepts and principles involved.

The school in which the research took place is part of a large urban school district located in a predominantly Hispanic community. The student make-up of the school consists of approximately 86% Hispanic students, 9% White, non-Hispanic students, 2% Black, non-Hispanic students, and 2% Asian/Indian/Multiracial students. The action research study was implemented in my seventh-grade gifted science class, which consisted of 20 students. For this group, a unit on forensics was incorporated within the fourth grading period.

Research

Funkhouser and Deslich (2000) concluded that forensics can be the basis of a curriculum that promotes analytical thinking and problem solving. By integrating various sciences to solve a specific problem and engaging in the process of scientific inquiry, teachers may utilize forensics as a means of approaching science from an application point of view that allows for many avenues of exploration which encompass many disciplines. Funkhouser and Deslich were also able to link forensics to greater student motivation and interest levels.

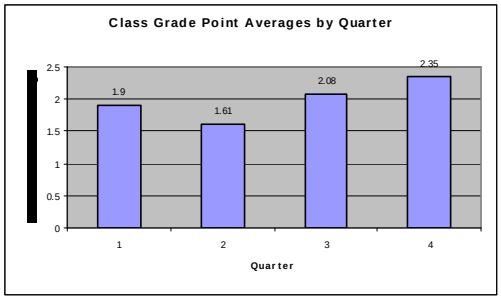
Additionally, Allen, Berkowitz, and Louden (1995) were successful in finding a positive correlation between forensics and critical thinking. The utilization of multiple perspectives as a problem-solving skill seems to play a significant role in enhancing the analytical reasoning process.

Data/Tools

The data sources included student work samples, direct observation, and student interviews. Comparisons of student participation and achievement were made between the study of forensics and the study of the other units taught throughout the year. Student motivation was evaluated by examining class participation and frequency of completing assignments. Student achievement was examined by looking at unit test grades and nine-week grades.

Analysis

Student participation, interest, and achievement peaked during the unit on forensics. This was reflected by direct observation as well as student performance. During the fourth grading period, where there was an emphasis on forensics, students completed 88.6% of their assignments, compared to 81.6% during the other three quarters. Furthermore, during the same grading period, nine-week class grade point averages rose 26.3% as compared to the other three quarters (from 1.86 to 2.35 on a 4.0 point scale). Finally, test scores on forensics exams were 24.1% higher than the cumulative scores on all other exams given throughout the year (a 1.80 test average on a 4.0 scale as compared to a 1.45 test average). Since activities and assessments conducted throughout the year incorporated comparable critical thinking requirements, this study supports the hypothesis that the inclusion of forensics enhances student motivation and analytical reasoning skills.



Policy Recommendations

The research indicates that hands-on, inquiry-based activities with real-world applications enhance student motivation and achievement within a critical thinking-rich science curriculum. Furthermore, the incorporation of forensics within the seventh-grade advanced middle school science curriculum not only provides an optimal way of promoting learning gains in analytical reasoning skills, but also provides a unique opportunity to incorporate key concepts and topics that may otherwise be absent. As such, schools should give special consideration to infusing real-world, relevant topics that promote problem solving, such as forensics, into the curriculum.

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