

## **EDIS 788 MATHEMATICS/SCIENCE/EDUCATION FIELD PROJECT AS A CAPSTONE EXPERIENCE IN FIVE YEAR BA/MT TEACHER EDUCATION PROGRAM**

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As a culminating experience, students in the Elementary Education Program Area at the University of Virginia are expected to engage in a field project/thesis experience in the final semester of their program of study. This session will provide an overview of the Field Project/Thesis Experience as it currently exists and will discuss possible variations to encourage more math and science collaborations.

### **An Overview of The Current Capstone Experience**

In the Five Year BA/MT Teacher Education Program at the University of Virginia, the Elementary Education Program Area students are expected to engage in a culminating activity in the final semester of their program of study. The Field Project/Thesis requirement that is included in the Five-Year Teacher Education program is a means by which students in the Elementary Education Program can demonstrate their ability to: identify a problem or issue that is worthy of in-depth exploration, develop a plan or means by which the problem or issue can be studied, engage in those necessary activities to fully explore the problem or issue, report on the results of the exploration and study of the problem, and offer a solution or alternative solutions to the problem or issue.

At the present time, students in the Elementary Education Program Area have been given several options with respect to the means by which they fulfill the Field Project/Thesis requirement. Students may: engage in an investigation of a self-selected topic/area of research, choose a technology oriented project that will be related to some aspect of instructional technologies and classroom implementation issues, or engage in a case-based course (CaseNET) focused on issues of interdisciplinary teaching and internet technologies.

Students in the Elementary Education Program typically engaged in an investigation of a self-selected topic/area of research. Working either alone or with a partner on a topic/area

of investigation, students identify a classroom teacher or teachers with whom they have worked in the past to serve as a resource and project guide. Each classroom teacher provides, where necessary, access to a classroom or classrooms or perhaps even to a school or number of schools depending upon the project's requirements to provide students with the opportunities needed to complete the investigation. The individual student or team, with the assistance of the classroom teacher and a university supervisor designs, implements, evaluates, and reports on the project. Each student or team is required to complete a written report (thesis paper) that may be submitted to the ERIC Document Service on the individual or team's behalf.

A number of students select a technology related project and enroll in an Instructional Computing class, in conjunction with their field project class, that will provide the technical background and support to enable the student to design, implement, and evaluate a project related to some aspect of instructional technology. Students engaged in the technology infusion project typically work within schools and classrooms seeking assistance with technology. Elementary Education students have completed projects related to such topics as techniques for managing a one-computer classroom and a study of the effects of computer location on first graders' usage of computers.

The third option currently available for Curry School of Education Elementary Education students is that of the CaseNET Interdisciplinary Teaching class that is case-based. In this course, all course materials, including readings, reside on the Web. Participants in the course use a variety of Internet technologies. Students connect to other educators across the nation to discuss ways to deal with problems and issues teachers and administrators face on a daily basis. The course is viewed as an opportunity to confront real problems using current technology and as a means by which experiences in the Curry School of Education can be synthesized as a culminating experience.

Since 1991, approximately 100 field projects have been completed and submitted to ERIC by Elementary Education students. Students have completed contracts with classroom teachers and university supervisors that have specified the: project title, problem statement, setting, participants, major goals to be accomplished, steps to be taken to reach the goal, and the project evaluation process.

All projects have been presented along with visuals and related products in the final weeks of the semester. Students at all levels and all faculty in the Elementary Education program are invited to attend the Field Project Presentations and feedback has been provided to the student presenters. In previous years, student presentations have been evaluated using a Likert type scale that has focused on the:

- explanation of the problem or topic
- organization and sequencing of ideas and concepts presented
- evidence of breadth and depth of research on the topic
- use of illustrations and examples to add meaning to major points
- use of audio-visual materials or technology
- explanation of the process of the study
- presentation of the results
- implications or usefulness of the findings or results of the study or project
- overall impression of the project.

Tabulation of feedback sheets has consistently resulted in extremely high percentages of positive reactions to the student projects. Following the project presentations, students are expected to submit a written paper that is read and evaluated by program area faculty and the university supervisor. The evaluation of the written explanation of the field project focuses on such items as:

- general grammatical usage
- explanation of the reasons leading to the choice of project topic or area of investigation
- evidence of depth in the literature review
- rationale and justification for the project
- logical sequencing of the steps of the project
- logical sequencing of the components of the report
- use of available resources
- evidence of coordination of resources in the completion of the project
- depth of discussion of the problem
- explanation of differences between contract plan and final project
- objective reporting of the findings
- acknowledgment of possible competing explanations for the results

- implications and suggestions for future study.

All written papers are evaluated as well in terms of suitability for submission to the ERIC Document Service. Such items as the use of tables, charts, and other attachments and overall conformation to an American Psychological Association (APA) style format are also taken into consideration as papers are considered for submission to ERIC.

### **Future Plans for Math/Science Capstone Experience**

In the newly revised PreK-6 Elementary Education Program at the University of Virginia, the final capstone experience will be expanded to include a fourth option. Students will be given the opportunity to engage in a Mathematics/Science Capstone Experience that parallels the capstone experience in the College of Arts & Sciences. While the details of this particular course are still being developed, the Elementary Education Program area will make available to all its students the opportunity to engage in a team activity that is focused on the investigation and exploration of a math/science related issue in education. Working collaboratively with the Arts and Science faculty who have offered the Life, Physical, Earth and Space science courses and the Geometry and Measurement, Numbers and Number Systems, and the Data and Chance classes, the Curry School of Education faculty will structure a final capstone experience that will be focused on mathematics and science issues as they relate to education exclusively on the design, exploration, and investigation of a math/science related issue.

The capstone experience for Elementary students in the College of Arts & Sciences consists of a two semester experience. Students will work in teams of four or five and complete a mini-project during the first semester. Working collaboratively, the students will explore such issues as forensic science, global positioning systems, sound, modeling, and perhaps some aspect of the material sciences. This mini-project will enable both A & S and Curry faculty to evaluate the students' mathematics and science knowledge, skills, and abilities.

The second semester of the Arts & Sciences capstone experience will be focused on the development of a specific research project in mathematics and science. If the mathematics/science option is selected in the Curry capstone course, a research project related

to mathematics and science is to be conducted with children. This particular experience will be consistent with and conform to the particulars of the existing field project/thesis experience that have been outlined thus far.

It is within the context of this second semester experience that the students will act as researchers and engage in action oriented research at the classroom level and report on their findings. All Elementary Education students in the Curry School who have participated in this experience will have then demonstrated their own classroom research skills within a math and science context. With completion of the two research projects, one - where students perform scientific research, and the other - where students perform educational research focused upon math and science content, students will have a better understanding of the nature of science, and the nature of science teaching.

To date, Elementary Education students in the Curry School of Education have completed Field Projects related to Mathematics and Science topics such as:

- a study of multiple choice vs performance science assessments for second grade students
- the impact of cooperative learning on student attitudes toward math
- a study of the effectiveness and comprehensiveness of a school mathematics program
- at-risk students' attitudes towards science
- the effect of relaxation and visualization on information retention in fifth grade students in science classes.

The new two semester Arts & Sciences math and science capstone experience, and the parallel project added as option four in the Curry capstone, should result in a number of interesting and stimulating math and science focused field projects.

## **In Conclusion**

Given the fact that the Five-Year BA/MT Teacher Education Program at the University of Virginia for Elementary Education students has an already established field project component as a final culminating experience, the inclusion of a Math/Science/Education Capstone Experience will be relatively easy to accomplish. There already exists a functioning capstone experience in the Curry School that can now be expanded to include a clear focus on math and science related issues. With the offering of college courses in mathematics and

science designed specifically for Elementary Education students and the capstone experience offered in the College of Arts & Sciences, the education/math/science capstone experience will be a natural outgrowth of that general studies background and be a significant component in the final semester of the program. Not only will our Elementary Education students have experienced action research within the elementary classroom, they will have demonstrated their ability to be competent classroom researchers as well as competent and knowledgeable classroom teachers. ■