

THE INTRODUCTION OF WEB-BASED INSTRUCTION INTO THE UNDERGRADUATE STEM CURRICULA AT FLORIDA A&M UNIVERSITY

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BACKGROUND

This paper describes the process used at Florida A&M University (FAMU) to launch a series of initiatives specifically designed to integrate web-based instruction into its science, technology, engineering and mathematics (STEM) curricula and improve the overall quality of STEM programs. Florida A&M University, a historically black university (HBCU), is one of the largest producers of baccalaureate degrees to African-American students. Its current enrollment of 12,000 students includes over 1900 students majoring in one of the STEM programs. FAMU is committed to significantly increasing the number of African-American students who qualify for admission to STEM graduate degree programs and ensuring the development of a well-prepared, competitive and diversified workforce in STEM fields.

In the past, undergraduate STEM students have been taught using a standard lecture format, in which, the course instructor controls the pace, the sequence, and the presentation style of the material mastered by the student. However, it is important that STEM students at FAMU become intimately familiar with the same web-based learning environments they will encounter in graduate programs and the workplace so they won't be at a disadvantage and will remain competitive in these fields.

One initiative designed to integrate web-based instruction into the STEM curricula is the National Science Foundation sponsored FAMU – Undergraduate Program (FAMU-UP) Course Development Mini-Grant Program. The FAMU - UP Mini-Grant Program provides funding to FAMU STEM faculty to develop, implement, and assess the effectiveness of web-based teaching and learning methodologies.

The introduction of web-based instruction in the required and elective STEM curricula involves collaboration from all segments of the university community including administration, faculty, staff and students. The integration of instructional technology elements is the key to successful web-based course development. This includes: (1) hardware requirements, (2) selection of web-based course delivery system (i.e., Blackboard) and (3) evaluation of “ease of use” of various web course content development software tools. In addition, several pedagogical issues must also be addressed including: (1) efforts required to “encourage” faculty to incorporate web-based learning and teaching methodologies into their courses, (2) face-to-face instruction versus distance learning and (3) defining which outcome measures should be used to determine the effectiveness of the revised course.

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METHOD

The purpose of the FAMU-UP Mini-Grant Program is to (1) significantly increase the use of web-based technologies for the delivery of course materials to FAMU STEM students and (2) to provide measurable evidence that supports the idea that web based courses can provide an advantage over traditional lecture courses.

STEM faculty members submitted Mini-Grant proposals for up to \$10,000 each. Allowable expenses for the proposals included faculty release time, student support, materials and supplies. In addition, limited funds for equipment were also available. A steering committee consisting of the Associate Deans of the College of Arts and Sciences and Engineering, chairpersons of the departments of chemistry, computer and information sciences, electrical and computer engineering, physics and mathematics reviewed each mini-grant proposal and selected the faculty recipients for the FY2000 course development mini-grants. Table I summarizes the projects funded that involved web-based technologies. The projects were developed in several phases.

Department	Project Title
Mathematics	Online Homework Grader for Calculus I
Mathematics	Calculus Web-Based Course
Physics	The Extension and Development of Web Based Tools in the Instruction of General Physics
Physics	Interactive Web Site for General Physics I Course
Physics	Enhancing Physics Education in the Undergraduate Program at Florida A&M University
Mathematics	Web-Based Course Development for Calculus I, II
Mathematics	Interdisciplinary Research Experience for Undergraduates

Table 1. List of FAMU-UP FY 2000 Course Development Mini-Grant Projects involving web-based instruction.

A team-based approach was used to provide the support and technical assistance needed to create the online learning environments proposed by the mini-grant recipients and to integrate the design, content and production of course materials and components. The team consisted of the mini-grant faculty recipient, a student research assistant, a project coordinator, instructional designer, graphic designer and computer support specialist.

Several workshops were conducted to provide training and assistance to faculty mini-grant recipients. A half-day session was conducted to provide information on the fiscal and programmatic documentation procedures involved with the Mini-Grant program. Topics also covered in the session included “Instructional Technology”; “SACS Notification Requirements”; and “Student Learning and Access.”

The faculty also received training on the use of Blackboard 5, the web-based course delivery system of choice at FAMU and NetObjects Fusion, a web-authoring tool. The

workshops were conducted for mini-grant recipients by staff at the FAMU Instructional Media Center (IMC) and held in the IMC Faculty Development Lab. The faculty also took other workshops offered by the IMC (i.e., PowerPoint, Adobe Workshop) as needed. Additionally, one-on-one sessions were conducted with the mini-grant faculty to address particular needs and to provide further assistance in the development of online course materials and information.

SUMMARY AND CONCLUSIONS

Upon completion of the first FAMU-UP Mini-Grant program cycle, each faculty mini-grant recipient presented or demonstrated the anticipated project outcomes to the FAMU-UP Executive Council and Project Staff. Faculty members are still at varying phases of the project; however at the completion of phase one, all of the mini-grant project faculty had created a course web presence that gave students access to the course syllabus, lecture notes, the course calendar, homework assignments and solutions, links to other sites related to the course and grades. Since the development of web-based courses requires time and effort, additional work is underway to further enhance the development and evaluation of these courses and to make the transition from web-supported courses to a full online implementation of the course.

The FAMU-UP Course Development Mini-Grant Program has the potential to be effective in the future development of web-based learning in the STEM curricular and enhancing distance learning efforts at FAMU and HBCUs in general. After an assessment of phase one of the project, we have learned the following: (1) the importance of continuous communication with program participants, (2) the generation of clear project milestones and (3) the creation of an on-going assessment and evaluation plan. It is also important to maximize the summer session in the development and revision of any courses; as faculty members get more involved in the routine of teaching and research activities during the fall and spring semesters, it becomes more of a challenge to devote the time and resources necessary to create a quality online learning environment.

A future goal of FAMU-UP is to create a ten-week summer learning experience for the faculty and student assistants to acquire the skills and knowledge to meet their particular project goals and have a finished product for the start of the upcoming fall semester. A Best Practices Conference will also be planned, so that mini-grant recipients can share their experiences with other faculty members at the university. The conference will also serve as a dissemination and transfer strategy for further web-based course development projects at FAMU and other HBCU institutions.

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