

Integrating Technology into Undergraduate Mathematics Programs

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ABSTRACT

The Department of Mathematics at Jackson State University (JSU), Jackson, MS, a Historically Black College or University (HBCU) in an urban area, utilizes Mathematica, MATLAB, LaTeX, and Tex to support instruction in several mathematics courses, including its calculus sequence. However, there are no professional development programs to train faculty how to implement these software packages. To address this professional development need at JSU and other HBCUs, a workshop has been designed to cultivate faculty technological, pedagogical, and content knowledge (TPACK). The Calculus Workshop, held at JSU, is designed to develop faculty expertise in three areas: (1) using computer technology equipped for teaching, (2) learning and researching in the mathematical sciences, and (3) promoting the integration of technology into undergraduate mathematics research programs. The workshop consists of two daylong sessions and follow-up meetings that provide intense training in the use of the aforementioned technologies. The participants comprise faculty members from mathematics departments at HBCUs in Mississippi and Louisiana. The Calculus Workshop aims to facilitate a community of learners in which the participants will contribute by presenting their best practices and detailing the impact of technology on their teaching, student learning, and undergraduate research experiences in the mathematical sciences. In order to ensure the effectiveness of the Calculus Workshop activities, evaluations will be used to systematically analyze the impact of the project on the TPACK of faculty participants. Later stages of the project will include

assessments of student learning as a result of faculty participation in The JSU Calculus Workshop.

To achieve the workshop goals the following specific objectives have been developed:

1. Encourage HBCU mathematics faculty to integrate technical computer software programs into classroom lectures, activities, and projects;
2. Enhance faculty understanding of the use of technology as a teaching, learning and research tool;
3. Develop faculty self efficacy with the use of technology in the teaching and learning of mathematics in general, and calculus, in particular;
4. Train faculty in developing course guidelines and projects that incorporate technology;
5. Cultivate a community of faculty who are committed to enhancing calculus sequences and upper division mathematics courses through integration of classroom technology.
6. Improve student understanding of mathematics to ultimately increase mathematics course pass rates and college retention.

PROJECT ACTIVITIES:

The outlined objectives will be attained through the implementation of the following activities:
(a) Conduct a 3-day Calculus workshop to train participating HBCU faculty in teaching calculus with Mathematica and word processing in Latex

or Tex;

(b) Support faculty members as they incorporate the technology into both the teaching of calculus or selected upper division mathematics courses and mentorship of undergraduate students in research at their respective institutions.

(c) Organize a mid-year workshop for participants share insights of technology implementation, pitfalls common to novice users, and observed effects of student learning.

(f) Advance the workshop to an annual conference on the use of technology in the teaching and learning of mathematics at post-secondary institutions.

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