Integration of Technology into Developmental Mathematics to Enhance Course Completion

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Harford Community College

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Overview

I) Harford Community College Overview

II) Developmental Mathematics at HCC

III) Implementation of Technology and Assessment Methods

IV) Findings

V) Next Steps

VI) Questions

Harford Community College

- FY 2011: 9,560 credit students
  - 2,351 first time college students
  - 942 undeclared major
  - 930 declared General Studies majors
  - 878 Nursing Preparation track
- Degrees Awarded in FY 2011:
  - 166 General Studies
  - 111 Nursing
  - 94 Business Administration

Transitional Mathematics at HCC

- We serve approximately 2,500 students per semester
  - Open enrollment institution
- We offer 55 – 65 sections of Transitional Mathematics per semester

Developmental Mathematics at HCC

- **3 course sequence**
  - Math 001: Fundamentals of Mathematics
  - Math 002: Introductory Algebra
  - Math 017: Intermediate Algebra
- **2 course sequence**
  - Math 010: Pre-Algebra
  - Math 018: Combined Algebra
- **1 accelerated course**
  - Math 019: Accelerated Review of Intermediate Algebra

Developmental Mathematics at HCC

- Online courses
- Hybrid courses
- Face-to-Face courses
- 13-week courses

Challenges in Developmental Mathematics at HCC

- Course attrition rates
  - 45% to 55% per semester
- Retention and persistor rates
- Format of courses
- Overlap in content
- "One size fits all"
  - Credit-level mathematics
  - Individual learning styles

Plan to Improve Independent Student Learning

- Assigned problems were not beneficial to students
  - "Back of book"
  - Too little feedback on problem areas
  - Length of time in receiving feedback
- Emphasis upon making independent learning and reinforcement **meaningful** to the student

Implementation of Technology

- Fall 2008: Some faculty begin using MyMathLab software for assignments
  - Make independent learning and reinforcement more meaningful to students
  - Immediate feedback
  - Monitor time spent on assignments
  - Develop personal-management skills
  - Supplementary study materials

Assessing Student Learning

- From Fall 2008 to Spring 2010, compare sections using MML to those not using MML.
  - Completion rates
  - Overall homework grades
    - Benchmark 70%
  - Course grade
- Student survey
- Tutoring Center Survey

Challenges using MML

- Student reluctance
  - Technology challenges (input, capability)
  - Accountability
  - Added cost
- Faculty reluctance
  - Training
  - “Out of my element”

Resolution to Challenges

Student Challenges

- Created a “help file” for problem areas (graphing, exponents, radicals)
- Packaged MML with custom text
- Information at beginning of course

Faculty Challenges

- Faculty training minimal
- Did not require for all faculty

Findings

- There is a strong, positive association between a successful assignment grade and successful completion of the course
  - Tracked progress in Math 002, 010, 017, and 018
  - n = 931 (successful assignments, regardless of the format of assignments)
  - 88.1% of students that successfully completed assignments successfully completed the course

Findings

- There is a strong, negative association between an unsuccessful assignment grade and successful completion of the course
  - Tracked progress in Math 002, 010, 017, and 018
  - n = 584 (unsuccessful assignments, regardless of the format of assignments)
  - 25.7% of students that did not successfully complete assignments successfully completed the course

Findings

- There no significant difference between the proportion of students that successfully complete their course and the method used to deliver assignments
  - 392 of 444 (88.3%) non-MML students successfully completed homework and their course
  - 416 of 475 (87.6%) MML students successfully completed homework and their course

Student Surveys (n = 603)

- 475 of 603 (78.8%) students responded that they spend between 2 and 6 hours per week on the MML assignments
- 461 of 603 (76.5%) students responded that the use of MML positively affected comprehension of course content
- 562 of 603 (93.2%) students responded that the MML problems either mostly or partially reflected quiz or exam questions

Common Negative Qualitative Themes from Student Surveys

- Some problems were overly difficult
- Number of problems too high and too much repetition of the same type of problem
- Challenges with input
- Access to computer or internet

Common Positive Qualitative Themes from Student Surveys

- Helped prepare students for quizzes and examinations
- Students found that having all resources housed in one location was helpful
- The “Show me How” feature was helpful in giving immediate feedback to resolve errors
- Unlimited attempts to formulate a correct solution

Summary of Tutor Center Surveys (n = 18)

- 15 out of 18 responses indicated MML tutoring sessions mainly focused on content
- 13 of 18 responses indicated there was no difference in the MML level of rigor or number of problems compared to non-MML

Conclusions

- From our assessment student learning and course completion are linked to:
  - Motivation
  - Time spent connecting concepts and working problems
  - Personal management skills
  - Immediate feedback and assistance

Next Steps

- Redesign using this assessment and other assessment results
- Reassessment of MML vs. non-MML courses

Questions

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