

MIDLANDS TECHNICAL COLLEGE



Adding a lab course to improve outcomes in a first programming course

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CPT-236 Introduction to Java Programming

- CPT-236 is the first programming course for most students.
- CPT-236 (or one of the courses it is a prerequisite for) is a prerequisite for at least 10 courses in the Computer Technology curriculum.
- The prerequisites for CPT-236 are MAT-102 *College Algebra* and RDG-100 *Critical Reading*.



CPT-104 *Introduction to Information Technology*

- The "gateway course" for the curriculum is CPT-104 Introduction to Information Technology, which includes programming concepts.
- The prerequisites for CPT-104 are RDG-100 *Critical Reading* and MAT-100 *Introductory College Mathematics*.
- While CPT-104 is not a prerequisite or corequisite of CPT-236, it is the prerequisite for most introductory courses in the curriculum, so it is usually taken as early as possible.



Success rates in CPT-236 Introduction to Java Programming

- The first programming course, often called Computer Science 1, has always been difficult for students. The overall attrition and failure rates are often high for this course at many different institutions.
- The intended course outcome
 - > Be able to interpret and write code in the Java language using control structures, arithmetic, logical, or relational operators, method definitions and calls, creation and use of object instances, creation and use of arrays.
- The performance measurement instrument is a standardized written examination, often used as the final exam.
- The introduction of this assessment has itself improved results by helping to standardize the content and approaches that various instructors have taken.



Success rates in CPT-236 Introduction to Java Programming



Percent successful in SLO



Completion rates in CPT-236 Introduction to Java Programming





Many actions have been proposed as solutions for poor success rates in CS 1

- Add more computer science prerequisites.
- Add more math prerequisites.
- Limit the scope of the course content.
- Strive for more uniform instructor calibration.
- Add open labs and tutoring.
- Add closed labs.



CPT-136 Computer Programming Laboratory

- 1 credit closed lab course as a co-requisite for CPT-236 Introduction to Java Programming
 - > 3 contact hours per week
 - > Usually not the same instructor
 - Introduces programming concepts at a slow pace to lag behind CPT-236
 - > No textbook or tests; just programming
- This course needed to be added to the SC *catalog of approved courses (CAC)*, which involved an extra process of approval.



Implementation of CPT-136

- Started in Fall 2017 semester
- The 2 instructors alternated creating assignments, using the same ones in all sections.
- Pacing and difficulty did not always match CPT-236.
- Many students did not enroll in CPT-136 although it was listed as a co-requisite.



Success rates in CPT-236 Introduction to Java Programming with CPT-136





Completion rates in CPT-236 Introduction to Java Programming with CPT-136





Preliminary Results

- Implementation coincided with the implementation of multiple measures for math placement.
 - Formerly, only math placement exam results or transfer credits were used to place students.
 - Now, students with a High School GPA of 3.25 or better with a fourth level of math were placed out of MAT 102.
 - > The RDG 100 Critical Reading prerequisite placement also changed.
- Since MAT102 is the prerequisite for these courses, more students, with less math preparation, may have been placed into the courses, which would tend to bring success rates down.



Preliminary Results







Preliminary results





Preliminary Results

- No visible improvement of SLO success rates
- Some improvement in overall numbers of students completing the SLO assessment (a final exam).
- Failure rates in CPT-236
 - > Totals during the two semesters of implementation
 - > For students taking CPT-136 (getting at least a "D"): 8.8%
 - > For students not taking CPT-136 (or failing or withdrawing): 13%



Some preliminary analysis

- Possibly better retention, which is good.
 - > You can't improve student outcomes for students who have been withdrawn.
- Clearly less failure in CPT-236.
 - Since that is a prerequisite for other programming courses, it helps the students quite a bit in their progression.
- We need to improve the impact.
 - > Calibration of pacing and difficulty in both CPT-136 and CPT-236
 - More intervention, possibly with embedded student tutors
 - Good student tutors are notoriously difficult to find.
 - Good programming students are often employed.
 - Good programming students may not be good tutors telling a student what to type is not helpful, but it is difficult not to do so.



Questions?



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