



LEVEL THE PLAYING FIELD – IMPACT OF ACADEMIC SUCCESS COURSES

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Abstract

The purpose of this research is to evaluate the impact of two preparatory or “Academic Success Courses”, UCSP 635 and UCSP 636, which targets graduate students with little or no programming experience and prepares them for professions that require knowledge and experience in modern computer programming languages. Data representing a total of 14 classes of two preparatory computing courses conducted over three semesters in 2016 were examined. Based on a preliminary analysis of the data, it was discovered that among those who took discipline-specific classes concurrently with the UCSP courses, about 2/3 of the students who successfully completed the preparatory courses received exemplary grades. Those who failed to complete the UCSP courses exhibited a lower level of performance in the program courses. This suggests that the Academic Success Courses may have a role in helping students to perform better on the discipline-specific courses. Further research is needed to follow these students through later semesters to assess a longer term impact of taking these preparatory courses and to understand the influence of demographics on the course success rate.

Introduction

Context and relevancy of this study

One of the goals of institutions of higher learning is to improve student success, i.e. help students complete their course of study successfully. This support can come in several forms including flexibility and easy access to courses. However, an area of support that is becoming increasingly important and growing in numbers is to provide preparatory courses that would bring students up to speed with background material needed for success in their degree program. Many institutions offer fundamental courses in writing, quantitative reasoning and discipline specific subjects to address this gap. At the University of Maryland University College (UMUC), we offer several graduate technology programs that need students to have some programming skills coming into the program. Since our students come from a diverse background, we developed two basic programming skills courses that we ‘strongly recommend’ them to take. Students in 4 different programs are informed about these courses and encouraged to complete them prior to/concurrent with programmatic courses.

In this study we look at the impact of taking and completing these preparatory courses successfully on student success in discipline specific courses and in the program.

Background

The University of Maryland University College (UMUC) specializes in educating busy professionals and offers career-relevant, affordable education that fits student life styles. It is a state university that primarily provides online classes but also onsite classes around the country and the world. A member of the University System of Maryland, UMUC is regionally accredited by the Middle States Commission on Higher Education, providing credibility and recognition to students' degrees.

The Graduate School at UMUC offers more than 55 graduate programs and specializations. These include master's degrees and specializations, doctoral degrees, and graduate certificates to help students develop professional value and open the door to career opportunities.

Because UMUC graduate students often enter graduate study with academic backgrounds in very different fields and return to study after a gap of many years, UMUC offers a number of courses outside the usual required program courses that are designed to help students succeed in their graduate studies.

These “Academic Success Courses” are non-credit and currently designated with the course prefix of UCSP. Although these courses carry no UMUC credit, they appear on the official academic transcript. At the successful conclusion of the course, a grade of P (Pass) is posted. The student interested in taking these courses must be admitted or have an application on file before registering for non-credit courses.

In 2015, two computer programming courses (one is foundational and the other is more advanced) were developed to address a recognized need for preparing students to perform coding in the following academic plans: Bioinformatics, Data Analytics, Database Technology, and Software Engineering.

Typically, students under these academic plans were expected to have successfully completed an undergraduate-level programming course (with a minimum grade of C for an undergraduate course, B for a graduate course). If they do not have demonstrated experience or prior coursework in software programming, the students are required to take both programming courses prior to taking any classes. Also students who have only experience with legacy programming languages such as COBOL or PRG are strongly urged to take the two courses.

Both classes last eight weeks and are presented online.

Here are the descriptions of both courses:

- *UCSP 635: Essentials of Computer Programming*
(Recommended preparation for bioinformatics, data analytics, database technology, and software engineering students with little or no programming experience).
An applied approach to creating computer programs. Discussion covers all aspects of basic programming, including variables, arrays, conditions, and input/output.

- *UCSP 636: Structure of Computer Programming*
(Recommended preparation for bioinformatics, data analytics, database technology, and software engineering students with some programming experience, typically with older languages such as PRG and COBOL.)
An applied approach to creating computer programs. Discussion covers aspects of programming related to the structure of the program, including loops, procedures/functions, and leveraging other software libraries/packages.

The research on the impact of student success courses on student performance has generated mixed results. A Columbia University study by Karp and Stacey (2013) on non-academic college prep course found short term gains in student persistence and completion of courses.

In a 2013 study, Boatman and Long looked at the nature of courses being offered to help students entering postsecondary education who are academically underprepared. Although the results are mixed the authors prescribe some strategies to offer such courses. These include, integrating the preparatory courses into the curriculum, adding of support programs outside of the classroom (tutoring, advising), and shorter courses. In a previous study by Boatman and Long, (2013) it was found that the impact of remedial (preparatory) courses maybe more beneficial for incoming student with higher need of academic preparation than those who needed it only marginally. Sonnert and Sadler (2013) looked at the impact of taking a pre-calculus course on students' performance on the college calculus course. Their results showed no significant improvement in grade for students who took the pre-calculus course.

A recent study by Shaffer et al. (2016) looked at the impact of prerequisites on student learning in two biology courses. The authors used a *familiarity scale* to assess if students performed better in later courses on topics that they had covered in the prerequisite. The results indicated that students got a better score only on topics that were covered extensively in the prerequisite courses suggesting that merely “covering” a topic in a prerequisite course does not result in improved future performance. The conclusions from this study support more student-centered teaching methodologies.

The majority of the studies on the impact of preparatory courses are at the college level, including those noted above, however, it is our belief that some of the conclusions and strategies maybe applicable to students entering graduate school.

Methods

The two academic success courses studied in this paper had three features. First, they were not required but recommended. This placed the responsibility on the student to make the decision to sign up for the course or not. Second, these courses were offered at a low cost to reduce financial burden on the student. Third, the courses supported active learning by offering short exercises that promoted critical thinking and problem-solving skills.

The first offering of the two courses- UCSP 635 and UCSP 636 was in the spring of 2016. Since then they have been offered in the summer and fall of 2016. Over 300 students have signed up for the two courses since the first semester.

Students were asked to take the two courses in a sequence as the 1st course is needed for the 2nd course. However, those who had some programming background and knew the basic principles could skip course #1 and proceed directly to course #2. We had primarily students from the following four programs take these courses – MS in Information Technology with a specialization in Software Engineering (MSIT-SWEN), MS in Information Technology with a specialization in Database Systems Technology (MSIT-DBST), MS in Data Analytics (MSDA) and MS in Biotechnology with a specialization in Bioinformatics (MSBIOT-BIFS).

Findings

Preliminary results from the three semesters of course offerings grades are summarized below:

- More students who took one of the UCSP classes did not take a programmatic class concurrently.
- Among students who took one of the UCSP classes and passed – and concurrently took one or more discipline-specific classes, most received an A (63%) rather than a B (37%).
- For those who withdrew from the UCSP class or classes, most received a B or lower grade in a concurrent, discipline-specific class.

Lessons learned from this study include the following:

- Emphasize to new students to the programs the value and success rate of these Academic Success Courses.
- Encourage students who withdrew or failed the class to retake the course.
- Consider expanding Academic Success Course to other disciplines.

Our findings suggest that although recommended, many students recognize the need for these courses, and sign up for them. Most of the students who took the course so far are in the MSIT-SWEN or MSDA disciplines and preliminary results show that these courses may be assisting in better performance on program-specific courses.

Conclusions

Academic Success Courses such as UCSP 635 and 636 offer significant advantages for students to better prepare for the competencies needed for success in key disciplinary areas. This in turn helps ensure that the students can graduate with career-relevant skills.

We want to conduct a longitudinal study to evaluate students' performance on courses that require programming skills. This will give insights into the long term benefits of taking these courses.

An area of further research is to investigate the impact of demographics on the course success rates. For example, are older students who do well in the Academic Success Course also do well in subsequent courses? Demographic data was not available during the course of this study but will be in the future.

Another possible area of investigation is to examine the use of diagnostic tests to determine if an incoming student should be required to take an Academic Success Course if they are not adequately prepared for the program.

References

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