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An IS Student's Worst Nightmare: Programming Courses

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Abstract

IS students continue to struggle to complete the programming courses often required in their course of study. In this research-in-progress, we describe how IS educators can learn about the predictors of success in programming courses and translate that knowledge into better advising for their IS students. We plan to administer an open-ended survey to IS educators, asking them what factors they believe predict success in programming principles courses. Based on their responses, we will determine if IS educator perceptions of variables predicting success in programming courses match the realities discussed in previous research. Then we plan to develop a set of guidelines so that IS educators can translate that knowledge into better advising for IS students.

Keywords: Programming principles, advising, IS students, student success

Introduction

Many educators have encountered the panic-stricken information systems (IS) student who is about to take the first programming course – or who is taking the course for a second or third time. Some researchers have noted that IS students tend to have very high failure rates in programming principles courses, with more than 35% failing to successfully complete the course with an A, B, or C (Beise, Myers, VanBrackle & Chevli-Saroq, 2003). Indeed, anecdotal evidence suggests that many students – not just IS students – struggle in programming principles courses. So what can we do to increase the success rate of IS students in programming principles courses?

In this research in progress paper, we first review the literature regarding the variables that predict success in programming courses. Then we plan to survey IS educators to see if their perceptions of success variables match the research reality. Based on the results, we plan to provide guidelines for IS educators to: 1) learn more about what predicts success in programming principles; and 2) better advise IS students on how to properly plan for and succeed in programming courses. The next section provides a brief overview of variables that influence success in programming courses.

Student success variables in programming courses

As computer science (CS) programs have begun to examine ways to improve the efficiency and productivity of their degree programs, they have focused on improving student success in the introductory courses. As a result, researchers have undertaken a variety of studies to determine what predicts success in programming courses. The next sections describe variables that influence success in programming principles in the following three categories: individual attributes (personality and ability), organizational attributes, and demographic data.

Individual variables

Personality

Computer science researchers have embraced personality instruments from psychology in an attempt to determine if beliefs, attitudes, intentions, behaviors, traits and states predetermine individual student success in programming principles courses (Boyle, Carter & Clark, 2000; Campbell & McCabe, 1984; Woszczynski & Guthrie, 2003). These researchers have identified a number of variables that affect student success in programming principles, including computer self-efficacy, student attitude, comfort level, cognitive profile, and learning style.

Ability

Computer science researchers have extensively studied ability variables, sometimes called academic or achievement variables. Researchers have studied and found support for the positive correlation of the following variables on student success in programming principles: GPA (Bauer, Mehrens, & Vinsonhaler, 1968; Butcher & Muth, 1985; Fowler & Glorfeld, 1981; Konvalina, Wileman, & Stephens, 1983), mathematics background (Byrne & Lyons, 2001; Campbell, 1990: Chowdhury, Fuelling & McCormick, 1987; Fowler & Glorfeld, 1981; Konvalina et al., 1983; Sidbury, 1986; Sorge & Wark, 1984; Sukhen Dey, & Mand, 1986), science background (Byrne & Lyons, 2001; Campbell & McCabe, 1984), reading comprehension (Wileman, Konvalina & Stephens, 1981), logical reasoning (Wilson & Shrock, 2001), ACT/SAT math scores (Butcher & Muth, 1985; Campbell, 1990; Oman, 1986, Sorge & Wark, 1984), SAT verbal scores [Beise, Myers, VanBrackle & Chevli-Saroq, 2003; Byrne & Lyons, 2001; Sorge & Wark, 1984), high school rank (Campbell, 1990), previous computer experience (Franklin, 1987; Hagan & Markham, 2000; Konvalina et al., 1983; Morrison & Newman, 2001; Wileman et al., 1981), and ACT composite score (Butcher & Muth, 1985).

Organizational variables

Computer science researchers have been surprisingly quiet on organizational/institutional variables that may influence success in programming principles. However, a recent study (Cohoon, 2001) analyzed the effect of computer science departments on female recruitment and retention, and the results may be extensible to success in the programming classroom. Departments with strong mentoring activities typically retained women better than departments without mentoring, and we believe the same would hold true for students struggling to succeed in programming principles courses. Moreover, having an environment where students are encouraged to study computer science has been shown to affect performance in programming principles (Wileman et al., 1981). Further, laboratory equipment, the quality and quantity of teaching assistants and tutors, and the diversity of the computer science faculty may also have an effect on student success.

Demographic variables

Finally, many researchers collect demographic variables on their respondents, including variables such as age, gender, ethnicity and marital status (Beise et al., 2003; Butcher & Muth, 1985; Byrne & Lyons, 2001; Campbell & McCabe, 1984; Chowdhury et al., 1987; Evans & Simkin, 1989; Fowler & Glorfeld, 1981; Konvalina et al., 1983; Mazlack, 1980; Sorge & Wark, 1984; Taylor & Moundfield, 1991; Taylor & Moundfield, 1991; Wileman et al., 1981; Woszczynski & Guthrie, 2003).

IS educator perceptions of success in programming courses

After researching variables that influence success in programming courses, we then theorized that IS researchers might be unaware of these variables and thus, might be ineffectively advising their students on how to succeed in programming courses. Therefore, we designed a simple survey to deliver to IS educators. We plan to ask the following open-ended question:

What factors do you think best predict IS student success in programming courses (list as many as you believe are important)?

We also plan to collect demographics on the respondents, including rank, years of teaching experience, and gender. After survey administration, we plan to conduct qualitative and quantitative analyses to interpret the data and make recommendations.

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