



Investigating student motivation in the context of a learning analytics intervention during a summer bridge program



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ARTICLE INFO

Article history:

Available online 10 August 2014

Keywords:

Learning analytics
Motivation
Early warning systems
At-risk students
Design-based research

ABSTRACT

Summer bridge programs are designed to improve retention and academic success among at-risk populations in postsecondary education by focusing on successful skills, behaviors, and high impact practices that promote academic performance. Recent research on these programs has focused primarily on how students' incoming demographics and prior academic performance predict academic performance at the university level. This study investigated changes in students' academic motivation orientations over the course of one bridge program, and how a learning analytics-based intervention was employed by academic advisors to inform their face-to-face meetings with students. The results of our study show that students' mastery orientation decreased over the course of the bridge program, and indicate that students' exposure to displays of their academic performance negatively predicts this change. The findings suggest that student perceptions of their goals and formative performance need to be carefully considered in the design of learning analytics interventions since the resulting tools can affect students' interpretations of their own data as well as their subsequent academic success.

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1. Introduction

Retention has been seen as a critical issue in higher education for decades. Admitting students who fail to graduate is devastating for the students, and has ramifications for institutional accountability and related revenue models. Indeed, there is a newfound sense of urgency to address this issue because of the new institutional rating model proposed by President Barack Obama to tie U.S. federal financial aid to graduation rates, tuition, and the percentage of lower-income student enrollment (Lewin, 2013). Consequently, postsecondary institutions are ever more interested in investing in viable and successful models to increase retention, particularly for groups of students with historically lower graduation rates, such as first-generation college students (Dennis, Phinney, & Chuateco, 2005) and students from low-SES families (Adelman, 2006; Walpole, 2003).

Students' academic persistence has been a well-researched topic. Tinto's (1987, 1993) longitudinal work has demonstrated

that six areas—or components—contribute to students' decision to depart college before earning a degree: (1) pre-entry attributes, such as academic preparation, cultural background, and first-generation status; (2) students' goals such as academic major, and career choice, and level of commitment to achieving those goals; (3) students' institutional experiences, both formal and informal with peers, faculty, and staff; (4) integration and balance between academic and social interactions; (5) re-examination and updating of goals and commitments; and (6) decision finalization based on students' cumulative experiences. Related to Tinto's model, Astin (1975) asserted that students who physically and psychologically involved themselves in the academic and social opportunities in the college environment are more likely to persist. Further, Astin (1984) argued that student involvement is a behavioral manifestation of the psychological construct of motivation. In order to better assess and monitor the metrics related to student persistence, many postsecondary institutions have turned to learning analytics tools utilizing models driven by pre-entry attributes to address their retention concerns. These attributes are generally paired with students' formal institutional experiences (i.e., grades), and this approach has dominated the higher education intervention landscape (e.g., Arnold & Pistilli, 2012).

To combat declining retention rates for at-risk student populations, many institutions have developed summer bridge programs

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(Gandara, 2001; Myers & Schirm, 1999; Terenzini & Wright, 1993). Historically, these programs have been designed to provide academic support and information regarding college campus life, orient students to the institutional culture, and develop at-risk students' self-esteem and self-efficacy (Ackermann, 1991; Fitts, 1989; Garcia & Paz, 2009; Kezar, 2001; Pascarella & Terenzini, 2005). Put simply, "summer bridge programs are intended to address important preparation and achievement gaps that are evident in the research [on retention and persistence]" (Colyar, 2011, p. 123). Although these programs are extremely varied in programmatic content and implementation, most aim to develop students' study and time management skills, their ability to utilize university services (e.g., tutoring centers, libraries), and provide meaningful exposure to college course work and faculty (Cabrera, Miner, & Milem, 2013). Early evaluations and assessments of summer bridge programs were largely descriptive, relying on student satisfaction surveys (e.g., Ackermann, 1991) while more recent research has utilized comparison samples of non-participants, longitudinal analyses, and other empirical techniques (e.g., Allen & Bir, 2012; Cabrera et al., 2013; Strayhorn, 2011).

Students' intrinsic motivation to achieve their stated goals, and their capacity to plan and utilize available resources are fundamentally linked to their retention in higher education (Allen & Bir, 2012). However, the learning analytics tools that are currently available for deployment at a large scale do not include measures of student motivation, as reported either by the students themselves or from assessments by their instructors or academic advisors. These measures are difficult to include in large-scale analytics tools since such information is not typically captured by institutional student information systems. Whereas the assessment and evaluation of retention programs once relied primarily on student satisfaction surveys (Astin, 1993; Garcia & Paz, 2009; Strayhorn, 2011; Walpole et al., 2008), today a reliance on institutional records of high school preparation, standardized test scores, and student aid serve as the "basis for models that evaluate the effects of interventions on attainment outcomes" (St. John, 2006, p. 100). A range of data sources representing a broader characterization of the student experience is needed if technological tools are to successfully produce models that represent all of the components of Tinto's original model. In response, this study investigates students' motivational orientations and how assessment of those orientations can inform a learning analytics-based intervention employed during a summer bridge program to support data-driven decisions and actions of the academic advisors.

1.1. Research questions

The overarching research questions guiding this current study are:

- *RQ1*: To what extent, if any, do students' motivational orientations change throughout the course of a summer bridge program?
- *RQ2*: What factors predict the changes in motivation, if any, that occur over the course of a summer bridge program?
- *RQ3*: What is the relationship between advisors' use of a learning analytics-powered Early Warning System and their students' academic performance during a summer bridge program?

This study is the result of working in partnership with summer bridge staff; we believe that such partnerships are necessary in order to better understand the different factors that affect student's motivational orientations within the context of the summer transition program. These factors can, in turn, inform the future designs of learning analytics tools so that new tools include

non-cognitive as well as academic performance measures to ultimately improve student learning and retention.

2. Literature review

2.1. Summer bridge programs

The programmatic content and structure of summer bridge programs are, in most instances, inspired by Tinto's (1987, 1993) and Astin's (1984) foundational theories of student retention (Kezar, 2001). The content of these programs can vary widely, but typically include accelerated mathematics, English or writing, and general "college knowledge" courses (Suzuki, Amrein-Beardsley, & Perry, 2012). Offering these programs during the transitional summer months between high school graduation and college matriculation is intentional. Tinto (1996) argued that in order to increase student retention, an institution must "ensure that students receive the guidance they need at the beginning of the journey through college to graduation" (p. 4). Furthermore, the residential component found in most summer bridge programs is based on Astin's (1984) finding that living on campus is the single most important factor and positive predictor of persistence for all students.

Assessments of the impact and success of summer bridge programs have yielded inconsistent results. While some studies indicate that summer bridge programs improve students' academic success (Strayhorn, 2011; Walpole et al., 2008), others show no impact (Fletcher, Newell, Newton, & Anderson-Rowland, 2001) and some indicate decreased academic success (Ackermann, 1991). Further complicating these findings, Myers and Schirm (1999) claim that summer bridge program outcomes are more social than academic. To investigate these mixed results, Cabrera et al. (2013) conducted a longitudinal study assessing the impact of the University of Arizona's New Start Summer Program (NSSP) on participants' first year grade point average (GPA) and retention, controlling for incoming student characteristics. While programmatic participation significantly predicted first-year GPA and retention, this relationship became insignificant when controlling for first-year college experiences and student development.

As summer bridge programs have matured, research has begun to focus on the connections between student perceptions and academic success. For example, Suzuki et al. (2012) investigated students' confidence about college expectations and their sense of belonging following their participation in a five-week summer bridge program at Arizona State University. Bridge program participants had a higher likelihood of demonstrating these attributes than non-bridge students, and the program positively influenced their short-term retention. Bridge program participation also resulted in students' forming valuable friendships, learning about skills known to increase student success (e.g., note taking, time management), increased feelings of security and confidence, and greater sense of belonging at the institution. Similarly, Strayhorn (2011) investigated summer bridge students' academic self-efficacy, sense of belonging, and academic and social skills. His results indicated that summer bridge participation positively correlated with specific academic skills (e.g., use of technology, interpreting syllabi) and academic self-efficacy, but did not seem to affect students' sense of belonging or social skills. Students' positive beliefs about their academic skills and precollege aptitude also positively predicted first-semester grades in college, explaining approximately 30% of the variance in first-semester GPA.

2.2. Relevant learning analytics techniques and tools

Learning analytics techniques can utilize large data sets to provide decision makers with actionable information that can help

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