The Summer Bridge Program: An Effective Agent in College Students' Retention

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Abstract

Student retention is a consequential effort of all institutions of higher learning today. The survival of the institution is dependent upon the success of students in obtaining their degrees (Knox, 2005; Noel, 1978). In order to continue to grow a base of Science, Technology, Engineering and Mathematics (STEM) students and produce quality graduates, it is imperative that best practices in student success and retention be identified, documented and replicated. This study looked at the Tennessee Louis Stokes Alliance for Minority Participation Summer Bridge program results in STEM major retention and success in designated courses. Three years of the TLSAMP Summer Bridge were randomly chosen from the inception of the first joint TLSAMP Summer Bridge Program in 2004 and the last one in 2013. The years chosen for this study were 2008, 2012 and 2013. The following information was gathered for participants in the 2008, 2012, and 2013 TLSAMP Summer Bridge Programs: (1) Major, (2) If student returned to school after freshmen year (3) If a change of major after freshman year, ((4) First English course grade, and (5) First Math course grade. TLSAMP Summer Bridge showed an indication to be a best practice for student retention and success in those targeted courses addressed in the bridge program. From a broader perspective, it can be inferred that what works for STEM majors can also work for other majors when tailored for them and the culture of the institution. Further study on the effectiveness and implementation of summer bridge programs on student recruitment and student retention is recommended.

Keywords: summer bridge programs, student retention, higher education, best practice, student success

Student retention is a consequential effort of all institutions of higher learning today. The survival of the institution is dependent upon the success of students in obtaining their degrees (Knox, 2005; Noel,

1978). However, "despite a significant increase in national testing and high school graduation rates, African-Americans are still lagging behind in retention and graduation rates from postsecondary institutions on both the undergraduate and graduate level" (Brothers & Knox, 2013, para. 2). Since it has been cited that "access and success _ especially for underrepresented populations including first-generation students _ are predominant concerns for the nation" (Bastedo & Gumport, 2003; Heller, 2001; as cited in Soria & Stebleton, 2012, p. 674), the topic of identifying best practices for college student retention and success is paramount. According to *Measuring Up: The National Report Card on Higher Education (2008)*, the average retention rate among 4-year degree granting institutions in the eleven states under the Southern Regional Education Board was 74.7% in 2006. This is important, because in the same time frame the state of Tennessee's retention rate was 73%, which is below the averages of the other states in its regional association (http://measuringup2008.highereducation.org/). One must also pay attention to the fact that HBCU's have led the way in providing programs that introduce students to successful preparation for their majors (Roach, 2015).

Martinez (2013) stated that a million STEM careers in the U.S. alone will develop over the next decade. Contrastingly, science education in the United States is described as "underperforming in the recruitment, preparation and graduation of a cohort of diverse scientists and engineers large enough to drive the U.S. STEM enterprise" (Tomasko, Ridgway, Waller & Olesik, 2016, para. 1). As stated by Brothers & Knox (2013), "a sense of urgency is needed to increase the number of African Americans earning baccalaureate degrees through doctorate degrees in the STEM areas" (para 1). Therefore, STEM has gained attention as a particular area in need of improving graduation rates and programs such as TLSAMP reflect this urgency.

Student Success Methods

Researchers have identified forms of student support, faculty engagement, and enrichment as necessary for college student success (Knox, 2005; Strayhorn, 2012; Tinto, 2010). Burleson, Hallett, & Park (2008) cited research by Goldrick-Rab recognizing the impact of the first-year college experience on student retention to graduation. They termed what many refer to as college acclimation as "college knowledge" and defined it as "a specific skill set- social, academic, and cultural- necessary for successful transition to postsecondary education and degree completion" (Burleson et al., 2008, para. 2). Students who are not as engaged in college may find their experiences to be isolating and disconnecting, especially at large research universities with larger class sizes and fewer faculty interactions (Soria & Stebleton, 2012; Kim, 2009).

One method of introducing students to college life (socially and academically) is bridge programs (Tomasko et al., 2016). Summer bridge programs have been cited as a "best practice" in student success at the undergraduate level, along with faculty mentoring, peer mentoring, peer tutoring, supplemental instruction, and student research with faculty (Knox, 2005; Roach, 2015; Stolle-McAllister, 2011). "Bridge programs are a common method to introduce students to the rigor of college coursework and the study skills necessary to succeed in their chosen major" (Tomasko et al., 2016, para. 6). Subsequently, there appears to be agreement with the belief of Lee (2002) that research should present results of student

outcomes from interventions and the social aspects from the interventions.

Other Summer Bridge Successes

Results from programs focused on retention of STEM students of color have reported successes. The Meyerhoff Scholarship Program (MSP) at the University of Maryland Baltimore reported "black students who participate in the MSP are about twice as likely to graduate with a STEM bachelors degree and five times more likely to go on the the PhD than similarly prepared comparison students" (Stolle-McAllister, 2011, para. 2). Ohio State University also touted success by sharing that its Ohio Science and Engineering Talent Expansion Program (OSTEP) showed measurable gains in persistence with their STEM student participants over the general population of STEM students (Tomasko et al., 2016). Furthermore, Morgan State University's Foundations of Mathematics (FOM) program, an online summer bridge course with Saturday meetings, reports that more than 75% of their participants were able to skip developmental math and increase the likelihood of graduating in fewer than six years (Roach, 2015). Data from the University of La Verne's summer bridge program provides additional validity of bridge programs' success rates. Purportedly, the university found that attending the summer bridge program actually increased the likelihood of attending college (Ghazzawi & Jagannathan, 2001). Lastly, Robert Morris University also reported that students participating in their STEM Scholars program had higher retention rates than other students at the university, 80.5% compared to 77.5% for Fall 2009 to Fall 2010 (Kalevitch, Maurer, Badger, Holdan, & Sirinterlikci, 2015).

While some successes have been noted, other programs should report their successes. It is imperative to build the body of knowledge in this area. When more successes are reported, more information is added to the body of knowledge and readily available for duplication. This study looked at the Tennessee Louis Stokes Alliance for Minority Participation Summer Bridge program results in STEM major retention and student success.

Background of the Study

The Tennessee Louis Stokes Alliance for Minority Participation (TLSAMP) is a grant program funded by the National Science Foundation (NSF). The mission of NSF which was established by the United States Congress in 1950 is "to promote the progress of science; to advance the national health, prosperity, and welfare; to secure the national defense; and for other purposes" (NSF Strategic Plan, pg.3). NSF funds thousands of projects each year, and to support its decision to fund, NSF "consistently evaluates the impacts of its investments, to make more data-drive decisions, and to establish a culture of evidence based planning and policy-making" (https://www.nsf.gov/about/performance/). TLSAMP is categorized under NSF's Directorate for Education & Human Resources, Division of Human Resource Development Louis Stokes Alliance for Minority Participation program (LSAMP). The focus of LSAMP is improving undergraduate programs to increase the number of STEM students successfully receiving a baccalaureate degree and thereby increasing the number of under-represented minorities in the STEM workforce (https://www.nsf.gov/pubs/2015/nsf15594/nsf15594.txt).

TLSAMP consisted of six colleges and universities: Tennessee State University (TSU), Vanderbilt University (VU), Middle Tennessee State University (MTSU), University of Tennessee-Knoxville (UTK), University of Memphis (UoM), and LeMoyne-Owen College (LOC) as indicated in Table 1(www.tnstate/tlsamp). Tennessee State University is a public Historically Black College or University (HBCU) and served as the lead institution for the alliance. Tennessee State University is located in Nashville, TN and served about 9,000 students in 2017 (http://www.tnstate.edu/about_tsu/fast_facts.aspx). Vanderbilt University is a private Predominantly White Institution (PWI) located in Nashville, TN. In 2017, Vanderbilt University served more than 12,000 students (http://vanderbilt.edu/about/facts/). Middle Tennessee State University is a public PWI located in Murfreesboro, TN. MTSU is one of the top producers of undergraduates in Tennessee (http://www.mtsu.edu/about/index.php). The University of Tennessee-Knoxville is a public PWI located in Knoxville, TN. UTK served around 28,000 students (http://www.utk.edu/aboutut/numbers/). The University of Memphis is a public university traditionally considered a PWI, located in Memphis. UoM served over 20,000 students (http://oir.memphis.edu/WebReports/ProfilesAndFactbooks/CDS2016_2017.pdf). LeMoyne-Owen College is a private HBCU located in Memphis, TN and prides itself on its liberal arts, urban-focused education (http://www.loc.edu/about-loc/default.asp). From a recruitment standpoint, Memphis is the largest single-standing city in the state of Tennessee (https://www.usnews.com/news/best-states/tennessee/articles/2017-05-26/nashville-overtakes-memphis-as-tennessees-largest-city). An overview of the categorizations of the institutions is provided in Table 1.

TLSAMP hosted annual four-week summer bridge programs that were designed to help achieve the overall goal of increasing the enrollment and graduation of underrepresented students in Science, Technology, Engineering and Mathematics (STEM) majors by assisting students transitioning from high school to college. Each year the summer bridge program would be hosted by one of the participating campuses and students who had been admitted to each of the universities would report to the host campus for the TLSAMP Summer Bridge program. Host campuses would rotate yearly to each of the institutions in the alliance.

The TLSAMP Summer Bridge program identified eight program objectives:

1. Strengthen skills in Mathematics, Physics, Biology, Chemistry, Computer Applications, and Language Arts;
2. Provide a life applicable research project;
3. Improve written and oral communication skills;
4. Increase motivation and ability to achieve in college classes;
5. Provide exposure to a college environment and awareness of campus resources;
6. Expose participants to cultural, social, and academic enhancement;
7. Increase preparedness for careers; and
8. Promote parental involvement through a parent orientation and closing banquet.

Table 1
Categorization of TLSAMP Institutions of Higher Learning

Name	Private	Public	HBCU	PWI
LOC	X		X	
MTSU		X		X
TSU		X	X	
UoM		X		X
UTK		X		X
VU	X			X

The academic objectives were accomplished through intense classroom instruction, engineering research projects, and a series of presentations on topics such as study skills and research methods. The personal and career development objectives were met through presentations from the Career Center, Office of Greek Life, Campus Safety and Security, and others, as well as structured activities to enhance both academic and personal success. The students also participated in field trips and recreational activities.

Problem Statement

In order to continue to grow a base of STEM students and produce quality graduates, it is imperative that best practices in student success and retention be identified, documented and replicated. The TLSAMP Summer Bridge program has been examined as a best practice for student retention.

Limitations and Delimitations of the Study

Limitations and delimitations of this study included the following:

1) No control group was established at the onset of the TLSAMP Summer Bridge program.
2) The researcher did not have confidence in achieving an unbiased random sample from the randomly choosen years from each insititution after collecting and compiling data for this study.
3) Students were accepted into the program on a volunteer basis. Students who applied to each of the six universities identifying themselves as a STEM major were invited to attend the TLSAMP Summer Bridge Program.
4) The criteria for students invited to attend the TLSAMP Summer Bridge Program were primarily established by each institution and therefore not consistent across the alliance.
5) The number of students invited and the number of students attending the TLSAMP Summer Bridge program were primarily established by each institution and therefore

not consistent across the alliance with only a cap of 50 students total (combined of all institutions) being established.
6) Each of the six institutions had their own institutional admissions policies and degree program structures.

Methodology and Findings

All students who participated in the TLSAMP Summer Bridge programs were tracked once they arrived to their home institution if they still chose to attend one of the six TLSAMP institutions. Each of these students had chosen a STEM major and had been accepted into one of the six universities as a basis to their acceptance into the TLSAMP Summer Bridge program. Three years of the TLSAMP Summer Bridge were randomly chosen from the inception of the first joint TLSAMP Summer Bridge program in 2004 and the last one in 2013. The years chosen were 2008, 2012 and 2013. During the four weeks of the TLSAMP Summer Bridge program, participants received daily instruction in the areas of English and College Algebra. Therefore, the following information was gathered for participants in the 2008, 2012, and 2013 TLSAMP Summer Bridge Programs: (1) major, (2) if student returned to college after freshmen year (3) change of major after freshman year, (4) first English course grade, and (5) first math course grade. The course title and level of the first English and first math course may vary based on the institution, institutional requirements for enrollment, and student selection among other variables. This study answered the following research questions:

1. What percentage of students who participated in the TLSAMP Summer Bridge Program were successful in their first English course?
2. What percentage of students who participated in the TLSAMP Summer Bridge Program were successful in their first Mathematics course?
3. What percentage of students who participated in the TLSAMP Summer Bridge Program would return to school after their freshman year?
4. What percentage ofstudents who participated in the TLSAMP Summer Bridge Program would remain a STEM major after their freshman year?

TLSAMP Summer Bridge 2008

The demographics of the 2008 TLSAMP Summer Bridge program student population consisted of twenty-four (24) females and eighteen (18) males for a total of forty-two (42) students. The majority were Engineering majors (22) with Biology being the second highest major (11). The other stated majors were Chemistry (5), Computer Science (3), and Mathematics (1). The majority of the students were from the state of Tennessee (30) with others (12) coming from as far as Illinois or Michigan or as close as Kentucky or Alabama. Of these 42 students, thirty-nine (39) or 93% remained enrolled in college after their freshman year. Also, thirty-seven (37) or 88% were retained as STEM majors. As indicated in Table 5. From the targeted courses of English and Mathematics, 86% received a grade of "C" or above in their first English course and 86% received a grade of "C" or above in their first Mathematics course as indicated in Table 2.

Table 2
2008 TLSAMP Summer Bridge Program Participants English and Mathematics Grades

Course	"C" or above	"D", "F" , or "W"	No Information
English	37 or 86%	2	4
Mathematics	37 or 86%	4	2

TLSAMP Summer Bridge 2012

The demographics of the 2012 TLSAMP Summer Bridge program student population were eighteen (18) females and nineteen (19) males for a total of thirty-seven (37) students. The majority (17) declared Engineering as their major. Fifteen (15) students chose Biology as their major and one (1) chose Animal Science. Four (4) students' majors were not identified. Of these 37 students, thirty-three (33) or 89% remained enrolled in college after their freshman year. Twenty-two (22) or 59% were retained as STEM majors with eleven (11) or 30% changing to a non-STEM major and four (4) or 11% being unidentified. From the targeted courses of English and Mathematics, 78% received a grade of "C" or above in their first English course including one (1) student receiving Advanced Placement credit, and 70% received a grade of "C" or above in their first Mathematics course as indicated in Table 3.

Table 3
2012 TLSAMP Summer Bridge Program Participants English and Mathematics Grades

Course	"C" or above	"D", "F", or "W"	Advanced Placement	No Information
English	28 or 78%	2	1	6
Mathematics	26 or 70%	7	0	4

TLSAMP Summer Bridge 2013

The demographics of the 2013 TLSAMP Summer Bridge program student population were eighteen (18) females and nine (9) males for a total of twenty-seven (27) students. The majors included Engineering (10), Biology (7), Chemistry (4), Mathematics (4), and Computer Science (2). Of these 27 students, nineteen (19) or 70% were retained as STEM majors with six (6) changing to a non-STEM major and two (2) did not return to that university. Ninety-three percent (93%) remained enrolled in college after their freshman year. From the targeted courses of English and Mathematics, 100% received a grade of "C" or above in their first English course and 89% received a grade of "C" or above in their first Mathematics course as indicated in Table 4.

Table 4

2013 TLSAMP Summer Bridge Program Participants English and Mathematics Grades

Course	"C" or above	"D", "F", or "W"	No Information
English	27 or 100%	0	0
Mathematics	24 or 89%	3	0

TLSAMP Summer Bridge Retention

This study was interested in looking at the TLSAMP Summer Bridge participant's retention. For this study, the term retention means that the student returned to the same college or university after their freshman year without dropping or stopping out. This study also wanted to examine STEM retention. For this study, the term STEM retention means the student remained in the initial STEM major or moved to another STEM major after the freshman year. The data from this study showed that the TLSAMP Summer Bridge participants had an average higher than the approximate 73% reported for the state of Tennessee in 2006 (http://measuringup2008.highereducation.org/). Where as one year reported a low retention for STEM majors, the average of the three randomly chosen years was 72% which is higher than the national average of 67% reported by the National Science Foundation in 2009 (https://www.nsf.gov/nsb/sei/edTool/data/college-10.html). Table 5 represents the retention rates of the TLSAMP Summer Bridge participants.

Table 5
TLSAMP Summer Bridge Program Participants Retained

TLSAMP Summer Bridge Year	Retained after freshman year	Retained as STEM major
2008	93%	88%
2012	89%	59%
2013	93%	70%

DISCUSSION AND CONCLUSION

The TLSAMP Summer Bridge program showed a high level of effectiveness in preparing students for their first core curriculum courses of English and Mathematics. An average of 85% of the TLSAMP Summer Bridge participants received a grade of "C" or above in those courses. The TLSAMP Summer Bridge program made a concentrated effort to prepare students for those courses by including study in these two subject areas in the daily schedule while the other science courses were rotated.

The TLSAMP Summer Bridge program showed notable effectiveness in retaining students in STEM majors past their freshman year, with an average of 72% being retained in STEM from these three years. The combined average STEM

retention rate of the TLSAMP institutions for the academic years 2012 and 2013 was 66.3%. This is almost 6% less than the retention rate of the students who participated in the TLSAMP Summer Bridge program. The TLSAMP Summer Bridge program introduced the participants to careers in their majors, as well as to people who were in STEM careers.

Also, of substantial significance, TLSAMP Summer Bridge program showed a great level of effectiveness in retaining its students to return college after their freshman year with an average of 92% of participants from these three years returning. This average of 92% far advances the Southern Regional Educational Board's reported average of 74.7%, as well as the retention rate of 73% for the state of Tennessee (Measuring Up, 2008). This may be in part due to the camaraderie that was established among the TLSAMP Summer Bridge participants. These students were able to establish relationships during these summer months with fellow college students. These findings are in direct alignment with the three major factors contributing to minority student persistence identified by Charles Taylor in "Black Students on Predominantly White College Campuses in the 1980's". He identified the three factors to be academic preparation, social interaction, and financial resources (Taylor, 1986). Each of these three factors were addressed for participants of the TLSAMP Summer Bridge program.

By introducing students to college life before their freshmen year and submerging them into the rigorous demands of college courses, TLSAMP Summer Bridge program showed indication to be effective for student retention. It is apparent that summer bridge programs can improve college student retention and academic success for STEM students. They may also be a best practice at student retention and preparing students for college success. It can be inferred that what works for STEM majors can also work for other majors when tailored for them and the culture of the institution. Therefore, summer bridge programs are a smart investment in retaining students of color. It is also believed that summer bridge programs are effective recruitment tools. At a time when HBCU's are competing with Community Colleges as well as PWI's for the best and brightest students, it is certainly worth attention to try summer bridge programs (with funding) as a recruitment tool. During a time that budgets at most state institutions of higher learning are extremely tight, studies of this nature are needed to encourage the backing of outside funding agencies.

Further study on the effectiveness and implementation of summer bridge programs on student recruitment and student retention is recommended. In the data presented in this study, the randomly chosen year 2012 produced lower percentages of participants earning a grade of "C" or above in their first English and Mathematics courses compared to the other years, as well as lower percentages of participants returning after their freshman year and remaining a STEM major. The TLSAMP directors may want to identify changes that may have happened that year in regards to program implementation or even background information on the participants. While the basic structure of the TLSAMP Summer Bridge Program has remained the same across the board, this year stands out with low percentages. Possible causes of these low percentages would need to be identified to help with best practices for implementation for other summer bridge programs. Although it is recommended that any institution implementing a summer

bridge should structure it to fit their culture and climate, an overall premise must be established with consistant success rates. The future studies may also focus on other factors that may mitigate student retention as a further expansion on the body of knowledge concerning summer bridge programs.

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