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The Effects of Dual Enrollment Credit on Gender and Race

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The researcher of this study examined dual enrollment and Huskins Bill course effects on academic success and graduation rates by gender and race. Quantitative statistical measures including parametric and non-parametric means comparisons, including ANOVA, t-test and chi-square tests, were used to analyze data from 15, 527 North Carolina community college students. The researcher found that dual enrollment and Huskins Bill courses showed positive effects on GPA and graduation rates for non-white students and positive effects in graduation rate for female students enrolled in community college programs.

Keywords: dual enrollment, Huskins Bill, concurrent enrollment, college readiness, college success, race and retention, gender and retention, college success and race

Between 1994 and 2004, enrollment at post-secondary institutions in the United States grew at a rate of 17% from 1984-94 and 21% (National Center for Education Statistics, 2007). This increase in student matriculation has generated questions as to whether students are prepared for postsecondary work, especially as today's economic demands push workers towards postsecondary degrees and certifications. One concern is for non-white students, who, historically, have been less likely to attend postsecondary institutions and are currently less likely to graduate from them, and male students, who recently have fallen behind female students in postsecondary enrollment, attendance and performance (Swanson, 2008). College-style courses, such as dual enrollment programs have all been said to show promise for these groups and have proliferated in hopes of improving college performance. Some researchers (Klein, 2007; Morrison, 2005) agree and cite advantages these programs can provide such as a relief for student boredom and for "senioritis," or allowing for more independence in student study regimen. Existing research on these programs is qualitative or local in nature, leaving the opportunity for more quantitative inquiry on the subject and for studies that can be generalized to the national population of dual enrollment students. Also, conclusions from the research show mixed results in program effectiveness and there are few quantitative studies that address the question (Bailey & Karp, 2003).

Two quantitative studies (Eimers & Mullen, 2003; Spurling & Gabriner, 2006) using inferential statistics and data from small samples indicate positive effects in retention by dual enrollment students. Eimers and Mullen, though, found no effect in first-year GPA for dual enrolled students. Hoffman (2005) in an overview of several earlier studies found positive results for the programs, especially among non-white and low-income students. Hoffman also notes that non-motivation in the high school environment particularly effects male students and can be more pronounced among low income students. Findings from a large study in Florida and New York City using an extensive database (Karp, Calcagno, Hughes, Jeong, & Bailey, 2007) showed favorable returns for male students enrolled in dual enrollment courses. The findings also indicate that dual enrollment is positively associated with the likelihood that students will earn a high school diploma, initially enroll in a postsecondary institution, enroll full-time and persist in college to a second semester. Participating students had significantly higher college GPAs three years after high school graduation than did peers who did not participate

in dual enrollment programs (Karp et al., 2007). Researchers also tracked participating New York vocational students and found them more likely than their peers to pursue a bachelor's degree, earn higher first-semester GPAs and progress toward a degree (Karp et al., 2007).

Recommendations from two studies (Morrison, 2008; Reindl, 2006) suggest expanding access and offerings to dual-enrollment-type programs, a program type they say has shown success in various qualitative studies. Morrison bases his conclusions on data from North Iowa Area Community College, which has found success in student persistence and graduation in dual enrollment programs. Reindl's report looks at a broad range of programs that enhance college readiness. Bailey and Karp (2003) concluded that dual enrollment programs may offer an effective advantage for high school students bound for college, but their conclusions are based on qualitative measures. Another quantitative study by Swanson (2008) found dual enrollment effective in persistence to degree for females and high income students. The study used regression analysis and a large database of Iowa students; however, the data were from the early 1990s.

To address the discrepancies in existing literature, this study uses a causal-comparative research design to look at two types of North Carolina dual enrollment programs: dual enrollment, and Huskins Bill dual enrollment. The study is designed to investigate if there is a causal link between each program and to assess the academic success of male students and non-white students who took these courses and later enrolled in a North Carolina community college. The researcher of this study examined dual enrollment (also called concurrent enrollment, joint enrollment or dual credit) and Huskins Bill course effects of students in the North Carolina community college system on academic success and graduation rates by gender and race. Dual enrollment programs have recently gained educators' attention as they have shown promise for improving student success at postsecondary institutions as state budget cuts have brought more scrutiny to them. Students in these programs are typically rising high school juniors or seniors between 16 and 18 years old. Most are college-bound students seeking college-level credits through state articulation agreements that allow equal transfer of community college credits in "Core" courses to state universities, but students are not limited to these courses. Huskins Bill courses, a designation given by North Carolina to one type of dual enrollment program, are similar to dual enrollment courses where instruction often takes place at a secondary facility, but can be administered to a cohort of high school students taking classes together at a college campus. The instructor for these courses can be a high school teacher qualified to teach a college-level course, or a regular instructor at the administering postsecondary institution (North Carolina Community College System, 2009).

Based on findings in earlier studies that show a positive effect in college readiness by taking a higher education class in high school (Bailey & Karp, 2003; Conley, 2003; Kim, 2006; Spurling & Gabriner, 2002), and using evidence that these courses have a positive on postsecondary success and retention for non-white and male students, dual enrollment and Huskins Bill courses should echo these positive outcomes.

The specific research question addressed was:

- Is there a difference in first-year GPA and persistence to graduation that relates to race or gender for students who take dual enrollment or Huskins Bill courses in high school?

Data for the groups were taken from the North Carolina Community College System database. The database yielded information from all North Carolina community college students. This is an improvement over earlier quantitative studies (Eimers & Mullen, 2003; Kim, 2006; Spurling & Gabriner, 2002) that used data drawn from small or local datasets.

Research Methods

Data were drawn from the North Carolina Community College system database that contained information on students enrolled since the summer session of 2002 through fall 2008 from all of the 58 community college programs in the state. The data consist of a cohort of 15,527 individuals who graduated from high school in the spring or summer of 2003 and subsequently enrolled in a North Carolina community college in the fall of 2003. Approximately 79% of the students had no dual enrollment or Huskins Bill experience, 7% had one or more dual enrollment courses, and 14% had one or more Huskins courses. Female students made up 58.6% of the dataset with male students representing 41.4%. Non-white students made up 24.8% of the dataset with non-whites representing 3% of the dual enrollment sample and 10% of the Huskins Bill sample. Students within this cohort were tracked to determine which had Huskins Bill or dual enrollment experience while in high school and how many courses they had taken. The students were tracked through 2008 to determine graduation and success rates.

The sample contained only students who matriculated to a community college within a year after high school. The study looks at a group that is homogenous by student population (two-year college students) and by the program limitations of the community college. Many students at the community college seek terminal vocational degrees, while those not in a career program take core academic courses that they transfer to four-year institutions to begin studies in their majors. Choosing only community college students, the researcher provided a control for students who have similar backgrounds and career aspirations as opposed to

a sample that contains students who matriculated to both community colleges and four-year institutions. The sample also features students who are similar in that students were all motivated to enroll in a community college within a year after high school, indicating a sense of purpose among the students.

The GPA of each student at the end of the first year of college was also calculated from information in the database. The standard community college method of determining GPA was used. This method multiplies grade value on a four-point scale with course quality points and divides the factor by total quality points. Student GPA was chosen as an indicator of overall student success because it is a primary indicator of academic success, and higher student GPA typically shows that a student is well adapted to the college environment and will most likely continue and complete the program in which he or she is enrolled. Also, in the community college where successful students in some programs such as college transfer tend to transfer with high frequency, GPA offers an indication of success where graduation rate alone may not offer a complete picture.

To perform the causal-comparative analysis, the dataset was broken down into three comparison groups. Two of these groups, students who took at least one dual enrollment course while in high school, and students who took at least one Huskins Bill course while in high school, represented the treatment groups in the study. The remaining group included students who have taken neither a Huskins Bill nor dual enrollment course while in high school. Where statistical significance was found using ANOVA, a Tukey test was used for post hoc testing to determine which mean samples were significant. For comparisons of nonparametric statistics, the chi-square test was used. All calculations were performed with SPSS 17.0 statistical software. It allowed comparison of Huskins program outcomes (specifically GPA and graduation rate) with the outcomes of the dual enrollment program and it allowed comparison of the effects of both of these programs with non-Huskins and non-dual students. Furthermore, the design provides for a breakdown of important descriptive elements such as race and gender and the effect of these programs on both.

Discussion of Findings

Female students had higher first-year GPAs than male students in each of the groups (see Table 1), which included dual enrollment (2.21 over 2.1), Huskins Bill (1.95 over 1.9), and students with experience in neither Huskins Bill nor dual enrollment (1.68 over 1.57).

The test revealed a t-value of 2.06 for the comparison with an N of 1871 for the females and 1323 for males. The comparison was statistically significant at the .05 value, with a p-value of .039 (see Table 2).

In the comparison between male and female first-year GPA means between both dual enrollment and Huskins Bill students, females maintained a 2.05 average versus a 1.96 average for male students. Females averaged statistically higher GPAs in the groups; however, the difference in gain between male and female groups who took dual enrollment or Huskins Bill courses was not significant.

Table 1
Dual Enrollment and Huskins Bill First-Year GPA by Gender

Gender	Number	Mean GPA
Female (overall)	8572	1.76
Female dual enrolled/Huskins	1871	2.05
Female non dual/Huskins	6701	1.68
Male (overall)	6955	1.64
Male dual enrolled/Huskins	1323	1.96
Male non dual/Huskins	5632	1.57

This finding duplicates findings in other studies (Karp et al., 2007; O'Brien & Nelson, 2004) that suggest dual enrollment and Huskins Bill courses benefit non-white student college readiness.

Non-white students in the dataset averaged a first-year GPA of 1.14 for non-dual enrollment and non-Huskins students, while non-white dual enrollment students averaged a 1.54 first-year GPA and non-white Huskins Bill students averaged a 1.35 first-year GPA. Graduation rates showed a similar pattern with non-dual enrollment and non-Huskins Bill non-white students graduating at a rate of 13.8% and dual enrollment and Huskins Bill students graduating at a rate of 17.2%. This difference is statistically significant at .04.

Table 2
Independent Samples Test for Male and Female Dual Enrollment and Huskins Bill Students by GPA

	Levene's Test for Equality of Variances		*t*-test for Equality of Means						
								95% Confidence Interval of the Difference	
	F	Sig.	*t*	*df*	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
*	.064	.801	2.060	3192	.039	.088	.043	.004	.171
**			2.063	2861.183	.039	.088	.043	.004	.171

Table 3
ANOVA: Non-White GPA for Dual Enrollment, Huskins Bill and Students with Neither

	Sum of Squares	*df*	Mean Square	*F*	Sig.
Between Groups	30.086	2	15.043	12.357	.001
Within Groups	4674.477	3840	1.217		
Total	4704.563	3842			

Table 4
Homogenous Subsets for ANOVA of Non-White Dual Enrollment, Huskins Bill and students with neither

Tukey HSD[a,,b]

		Subset for alpha = 0.05	
Group	Number	1	2
Non	3343	1.146	
Huskins	378	1.345	1.345
Dual	122		1.541
Sig.		.090	.100

Note. Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 269.267.

b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.

Other studies have indicated positive effects on male GPA and retention based on earlier study findings (Karp et al., 2007; Swanson, 2008; Hoffman, 2005). However, in this study there was no significant difference in the size of the effect for dual enrollment between males and females. Dual enrollment and Huskins Bill courses had an equally positive effect on males and females. Earlier studies (Karp et al., 2007; Kirst & Venezia, 2007; Klein, 2007) found that dual enrollment and Huskins Bill courses have shown a greater effect for male students. This study finds that female students receive an equal benefit in first-year GPA from the programs.

In graduation rate females surpassed males among dual enrollment and Huskins Bill students as well. Female dual enrollment and Huskins Bill students graduated at a rate of 33.1% and males graduated at a rate of 25.5%. The difference is statistically significant at .001. This finding is also significant because it contradicts previous studies (Karp et al., 2007) that indicate a greater effect for male students, and it shows success in college continuation for female students in this group. Continuation to graduation is significant here because it suggests that dual enrollment and Huskins Bill courses offer female students performance advantages in college programs that extend beyond first-year success. It should not be lost, however, that both males and females who took dual enrollment and Huskins Bill courses benefitted in first-year GPA and graduation rate over those who did not take these courses. These programs still showed positive results for each.

Dual enrollment and Huskins Bill non-white students showed higher first-year GPA means and higher graduation rates than non-dual enrollment and non-Huskins Bill students (Table 3 and 4). The ANOVA showed a statistically significant difference between the Dual, Huskins Bill and non-dual and non-Huskins Bill group means at the .001 level. To determine which group means were significantly different, a Tukey post hoc test was performed. The test revealed that both dual and Huskins Bill non-white students showed a significant difference in mean first-year GPA from non-dual and non-Huskins Bill non-white students.

Implications

The higher GPA and graduation rates for dual enrollment and Huskins Bill non-white students demonstrate a statistically significant advantage from the programs. Though the increases in GPA and graduation rate for dual enrollment and Huskins Bill students appear small, they do indicate a significant step towards success at the postsecondary level. Graduation rates at two-year colleges tend to be low for numerous reasons: students transfer regularly to four-year schools, students face economic pressure and must drop out of programs early, or, students may take a few courses not intending on completing an entire degree. In addition to these reasons, as two-year public colleges have open-door policies, students are less likely to be prepared for the rigor of college work. The increase in GPA and graduation rate shown here through dual enrollment programs is a step in aiding student continuation.

Findings are important because they identify a positive effect on academic success and continuation to graduation in a postsecondary setting for a demographic that made up 24.8% of the dataset. Students with experience in either the dual enrollment or Huskins Bill courses showed a 5% higher rate of graduation and higher first-year GPAs, a significant boost for this large at-risk demographic. This finding agrees with findings in other studies that show dual enrollment experience shows a heightened benefit for minority student populations (Hoffman, 2005; Karp et al., 2007).

These results show promising outcomes in first-year college success and in graduation rate for non-white students taking dual enrollment and Huskins Bill courses. It also shows positive retention effects for female students over male students. Positive outcomes for non-white students taking dual enrollment and Huskins Bill type programs have also been duplicated in other studies (Karp et al., 2007; O'Brien & Nelson, 2004). This pattern of success warrants more attention by state education leaders to promote and expand dual enrollment and Huskins Bill programs specifically for these students and thereby help launch them into a successful and productive adulthood. Presently, dual enrollment programs are underutilized by non-white students (Hoffman, 2005; O'Brien & Nelson, 2004). Some ways this program can benefit these students are to put dual enrollment programs in schools with high populations of non-white students. State policymakers can work to establish more diverse partnerships with K-12 and community college administrations which will allow for creative programs involving dual enrollment and Huskins Bill type courses. These programs could focus on at-risk demographics within regions of the state or could target areas of workforce development that show promise for creating future employment or economic opportunity. Offering a mandate and the funding for these programs could provide a jumpstart for the creativity and initiative that is needed to create and successfully establish these ventures.

Community colleges, in particular, face the challenge of educating students with a diverse array of abilities. Dual enrollment programs are a vital resource for creating a successful bridge from secondary to postsecondary work for students. State cutbacks due to the recent recession have taken a toll on dual enrollment programs which are viewed by many casual budget reviewers as redundant programs. It is a mistake to eliminate these programs based on the assumption that high schools can cover the loss of the programs internally. When a program shows effectiveness in promoting higher student GPA and graduation rate, then it follows that the program should be instituted, supported, funded and promoted as a pathway to student success in all community college systems.

Limitations

The study design was limited in that it did not allow an accounting for variables such as previous student academic success (In North Carolina, dual enrollment and Huskins Bill students are required to have a set high school GPA before they can take a college course.) or for individual student motivation, which could work to self-selection students into the dual enrollment or Huskins Bill group. However, the dataset does compensate somewhat for motivation by featuring a cohort of students who matriculated to a community college within a year of graduation.

Another limitation is that the study looked only at North Carolina community college students. The study does not take into consideration students with Huskins Bill or dual enrollment experience who matriculated to four-year colleges and universities. This is an important student segment and warrants specific attention if the effects of these programs are to be completely understood. More study in this area is necessary.

This particular study offers solid evidence for dual enrollment and Huskins Bill course effectiveness for non-white students matriculating to community colleges, and it also shows positive effects for both male and female students in general. A principal step in being able to compete in the modern workforce is the ability of a large part of the workforce to succeed in postsecondary education (McCabe, 2000; Morrison, 2008). However, a major impediment to this step is the gap between secondary and postsecondary skill requirements which, according to one author, has created a "dead zone" between high school and college (Reindl, 2006). With more students matriculating to postsecondary institutions (Conley, 2007), programs such as dual enrollment and Huskins Bill which show effectiveness in the creation of college-ready students are in greater need for maintaining a job pipeline for students into the future, and, thus, are important in maintaining the economic welfare of the country and its population.

As high schools continue to grow programs that focus on college readiness, knowledge of the best methods of college preparation will be necessary to guide educators in implementing the best programs for students. Dual enrollment and Huskins Bill courses are two such programs that provide high school students with rigorous courses and that show success in preparing these students for postsecondary work. For students moving on to two-year colleges, these courses afford students a college learning environment for students to acquaint themselves with the pace and expectations of college work. Findings eliminate one inconsistency as indicated by Conley (2007), that high school course syllabi are undeveloped and unreliable. Courses taken by high school students at a college will have syllabi that align with postsecondary

learning goals, thereby better suiting them to continue a postsecondary regime effectively.

Administrators in secondary and in postsecondary institutions should look at evidence of the effectiveness of these programs to best gauge their place in improving student readiness. The task for the future will be to find the most effective ways these courses can be administered to students in order to reap the greatest gain from them, and to ensure that these courses are administered in consistent ways in order to preserve the reliability of the programs. In order to best do this, more studies should be undertaken to find how well these programs work with individual student variances, such as environment and individual learning styles and to gauge the best methods of effectiveness from course experience. Until then, administrators should expand these types of programs in order to benefit all students, but in particular to benefit a growing diverse student body that must be prepared to succeed.

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