

Does Prior College Credit Matter? A Longitudinal Investigation of Academic Success, Retention, and Degree Completion

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Supporters of concurrent enrollment programs tout its many benefits to students, parents, and involved institutions; however, findings from related studies vary widely. As more and more students enter college having earned a substantial number of college credits while concurrently completing their secondary education, it is essential to determine the value of such experiences. The purpose of this study was to explore the suggested value of prior college credits in relationship to student performance, retention and degree completion in college. The population for this study consisted of entering freshmen (1998 and 2003) in the College of Agriculture, Food and Natural Resources at the University of Missouri. Findings revealed that students who began college with prior credit experienced greater academic performance during their first year of college than students who entered with no prior credit. There was a relationship between number of prior college credits and both academic retention, and degree completion. Finally, prior college credit, when controlling for high school core grade point average and ACT score, accounted for only a small amount of unique variance in academic performance. These findings express trends between the 1998 and 2003 cohort groups investigated.

Keywords: prior college credit, retention, degree completion, postsecondary

Introduction

In today's society, opportunity is associated with admission to a four-year institution. According to McKeon, "Every student deserves the opportunity to pursue his or her educational goals" (2003, p. 1). However, a college education is not always within the grasp of every individual who may desire one. According to a report of the Advisory Committee on Student Financial Assistance (ACSFA, 2002), approximately one-half of all "college-qualified, low- and moderate-income high school graduates" in 2002 were unable to afford an education at a four-year institution (ACSFA, 2002, p. v). With the rising cost of college, there are many instances in which students and their

families cannot afford college (McKeon, 2003). In fact, within this decade, over two million college-qualified high school students will not attend college due to such barriers (ACSFA, 2002).

Several options exist to assist prospective college students and their families with the rising costs of higher education. One option is concurrent enrollment. Commonly referred to as dual credit or dual enrollment, "concurrent enrollment is the term used to describe programs that permit high school students to enroll in college-level courses prior to graduation" (Greenberg, 1989, p. 7). While concurrently enrolled, students earn credit toward a high school diploma, as well as toward a college degree.

Concurrent enrollment offers potential benefits to both students and parents. Students have the opportunity to earn college credit while still in high school which allows them to complete college programs at a more rapid rate or take major-specific courses earlier than other students (Greenberg, 1989). A second benefit, experienced by both students and parents, is a reduction in tuition costs. With courses at many colleges costing over \$300 per credit hour, a three-credit concurrent enrollment course can potentially save students and parents approximately \$1000 per course (Greenberg, 1989).

Initially, concurrent enrollment was viewed by many as a way to “provide a more challenging curricula to academically prepared high school students” (Kim, Kirby & Bragg, 2006, p. 1). In recent years, however, it seems as though the target population for concurrent enrollment has expanded to include any qualified high school students who are interested in taking college-level courses. The “explosive” growth of concurrent enrollment (Andrews, 2001), has illuminated the need for deeper investigations regarding its impact. To date, limited research has been conducted to determine the effectiveness of concurrent enrollment programs (United States Department of Education, n.d.). Much of the research published has been descriptive in nature or primarily based upon opinions and attitudes toward concurrent enrollment programs. The existing literature that addresses outcomes of concurrent enrollment varies greatly (United States Department of Education, n.d.).

One specific outcome of concurrent enrollment identified in literature is the connection between concurrent enrollment and retention rates in colleges. According to Eimers and Mullen (2003), students who entered college with either advanced placement (AP) or concurrent enrollment credits displayed a higher retention rate than students who entered with no previous credits. Additionally, Delicath (1999) found both concurrent enrollment credit and AP credit positively correlated with student retention into the sophomore year of college.

Conceptual Framework

The conceptual framework for this study was initially utilized by Smith & Garton (2008).

This model, adapted from previous work (Pascarella & Terenzini, 1991, 2005; Terenzini & Reason, 2005), was designed to address issues relating to student success and persistence in the first year of college. The model indicates three primary categories of variables involved in the study of factors that influence success at the collegiate level (Figure 1) including: pre-college characteristics and experience, the college experience, and outcomes. To meet the needs of studying college student development and success from an agricultural perspective the initial model was adapted to include sociodemographic characteristics, academic preparation, ability and performance as well as personal and social experiences in the category of pre-college characteristics and experience.

Slight modifications were also made to the college experience category. Sub-categories were adapted to include institutional environment and student experiences. Peer interaction was incorporated into the sub-category of student experiences. The outcomes identified in the revised model were changed from learning, development, change, and persistence to learning/development, persistence, and career/job satisfaction. Additionally, specific measures were identified for the revised outcomes.

Pre-college characteristics and experience encompass diverse factors that relate to the backgrounds and experiences of students. Included among these diverse factors are sociodemographic factors, academic preparation, ability and performance, and personal and social experiences. Each of these characteristics can have “powerful influences on students’ subsequent college experiences, learning, development, change, and persistence” (Terenzini & Reason, 2005, p. 6). Based upon this model, participation in concurrent enrollment programs would be considered pre-college experience since credit hours earned apply to both secondary and postsecondary degree requirements.

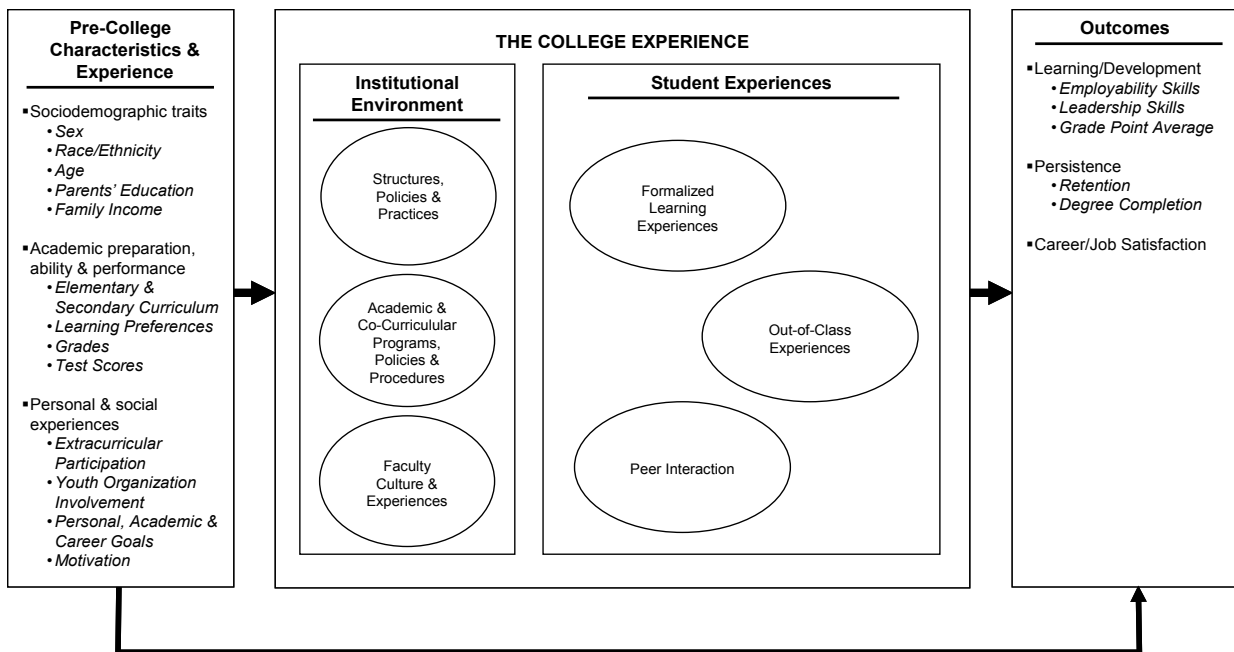


Figure 1. A model of influences on student learning (Adapted from Terenzini & Reason, 2005).

The college experience component introduces two additional categories of factors: the institutional environment and student experiences. In the original model of Terenzini and Reason (2005), institutional environment was referred to as organizational context. According to Terenzini and Reason, institutional effects “are more a function of what institutions *do* rather than what they *are*” (2005, p. 8). At times, such factors relating to institutional history and culture are overlooked in college impact literature. However, such “structures, practices, and policies...are more likely to influence student outcomes through the kinds of student experiences and values they promote or discourage” (Terenzini & Reason, p. 8). The institutional environment category consists of three factors: (a) structures, policies, and practices; (b) academic and co-curricular programs, policies, and procedures; and (c) faculty culture and experiences.

The structures, policies, and practices factor includes administrative structure, staff support, financial aid policies, collaboration among institutional employees, and communication of institutional mission (Terenzini & Reason, 2005). The second factor, academic and co-

curricular programs, policies, and procedures, encompasses the formal academic and student affairs program policies and procedures of an institution (Terenzini & Reason, 2005). This factor includes such things as personnel policies, faculty workload, course limits, professional development for faculty and staff, utilization of teaching evaluations, and other programs and policies that further support the integration of students’ academic and non-academic lives (Terenzini & Reason, 2005). Finally, the third factor, faculty culture and experiences, is based upon the philosophies and behaviors of faculty members toward teaching, research and service. According to Terenzini and Reason, faculty culture is reflected in a variety of ways, including how faculty interact with students (both formally and informally), how involved faculty are in activities and opportunities relating to teaching and learning, and the emphasis given to “promoting student encounters with diverse people, cultures and ideas in their classrooms” (p. 11). The culture of academic advising within an institution would also be an example of the faculty culture and experiences construct.

The student experiences component of the college experience consists of three factors including: (a) formalized learning experiences, (b) out-of-class experiences, and (c) peer interaction. Formalized learning experiences are defined as interaction with students and faculty members while completing coursework. Out-of-class experiences encompass a variety of college opportunities such as student organizations, study abroad opportunities and internships. Finally, peer interaction specifically occurs as a result of involvement with other students. This interaction may be as a result of personal networks, living situations (residence halls, learning communities) or sorority/fraternity organizations (Terenzini & Reason, 2005).

The outcomes included in the conceptual framework, including learning/development, persistence and career/job satisfaction all are impacted by the other components of the model (Terenzini & Reason, 2005). It is recognized that these are not the only outcomes that occur as a result of the combined pre-college characteristics and college experience; however, outcomes listed were the primary outcomes of interest for this study.

While promising, the linkages among students' pre-college experience, their college experience, and selected outcomes in relations to academic success in college have yielded a diversity of results. Academic performance, involvement in learning communities, youth organization participation, and prior college credit have been studied as potential predictors (Ball, Garton, & Dyer, 2001; Garton, Kitchel, & Ball, 2005; Smith & Garton, 2008) of student success in college. However, a more in-depth investigation is warranted into the factors that affect academic success in college. Can a consistent relationship between predictor variables and academic success be identified, and to what extent does that combination affect student retention and degree completion?

Purpose/Hypotheses

The purpose of this study was to investigate predictors of academic performance, retention, and degree completion of students enrolled in the College of Agriculture, Food and Natural Resources (CAFNR) at the University of Missouri. The following research hypotheses were developed to guide the study and applied

separately to freshmen entering the college in 1998 and 2003.

- H₁: Students who enter college with prior college credits have greater academic performance during their first year than students with no prior credits.
- H₂: A statistically significant variance in first year college grade point average (GPA) can be accounted for by previous college credits while controlling for university admissions criteria (High School Core GPA and ACT Score).
- H₃: A statistically significant relationship exists between the number of college credits earned prior to college matriculation and retention to the sophomore year.
- H₄: A statistically significant relationship exists between the number of college credits earned prior to college matriculation and degree completion.
- H₅: A statistically significant variance in final year college grade point average (GPA) can be accounted for by previous college credits while controlling for university admissions criteria (High School Core GPA and ACT Score).

Methods/Procedures

The two target populations for this longitudinal trend study were freshmen (first time college students) entering the College of Agriculture, Food and Natural Resources at the University of Missouri in the fall of 1998 ($N = 376$) and 2003 ($N = 338$). Prior college credit was defined as any college level credit earned prior to a student's first semester of enrollment at the university. These hours could have been obtained through dual enrollment programs in high school or earned by students through evening or summer courses.

Students' academic performance was measured by cumulative grade point average (CGPA) twice, once at the completion of the freshman year and again upon completion of the degree program. Retention was defined as a student returning for the sophomore year of college, without specific regard to number of credit hours obtained. Degree completion was based on a student completing his/her degree program within five years of beginning initial

coursework at the university. All data were obtained from student records through the college's academic programs office.

The first research hypothesis was analyzed using an independent samples *t*-test, while research hypothesis three and four utilized point-biserial correlations, interpreted using Hopkins (2002) descriptors. Research hypotheses two and five were tested using hierarchical multiple linear regression. An alpha level of .05 was established *a priori* for all statistical tests.

Results/Findings

The first research hypothesis stated that first time college students who had earned prior college credit would academically outperform students who entered with no prior college credit. The null hypothesis tested was:

H₀₁: There is no significant difference in academic performance between first year students who enter college with prior college credits and students who enter with no prior credits.

An analysis of first time college students entering the college in 1998 indicated that the majority (61%, *n* = 228) had earned prior college credit while the remainder (39%, *n* = 148) began their degree programs with no prior college credit (see Table 1). Freshmen who began their first year with prior college credit had a mean grade point average of 2.86 (*SD* = .72) after their first year of college. The mean first year college grade point average for students with no prior credit was 2.54 (*SD* = .92).

Based on Levene's test for equality of differences, equal variances were not assumed (*F* = 7.82, *p* < .05). A *p*-value for this one-tail *t*-test was derived by dividing the observed *p*-value in half. Findings indicate that students who entered college in 1998 with prior college credits had significantly higher first year cumulative grade point averages than students who entered with no prior credits (*t*₂₆₁ = -3.58, *p* < .05). Cohen's *d* was utilized to determine effect size; a medium effect size was found (*d* = .40).

Table 1
Independent Sample *T*-test on 1998 Freshmen Academic Performance by Prior College Credit (*N* = 376)

Credit Status	<i>n</i>	Mean GPA	<i>SD</i>	<i>t</i> -value	<i>p</i> -value
Prior Credit	228	2.86	.72	-3.58	.01*
No Prior Credit	148	2.54	.92		

**p* < .05

Five years later, in 2003, 338 first time college students entered the college. Once again, a majority (62%, *n* = 208) had earned prior college credit while the remainder (38%, *n* = 129) had no prior college credit (see Table 2).

The mean first year grade point average for students with prior college credit was 2.97 (*SD* = .74). Students who began with no prior college credit had a mean first year GPA of 2.51 (*SD* = .97).

Table 2
Independent Sample *T*-test on 2003 Freshmen Academic Performance by Prior College Credit (*N* = 338)

Credit Status	<i>n</i>	Mean GPA	<i>SD</i>	<i>t</i> -value	<i>p</i> -value
Prior Credit	208	2.97	.74	-4.54	.01*
No Prior Credit	129	2.51	.97		

**p* < .05

Based on Levene’s test for equality of differences, equal variances were not assumed ($F = 8.75, p < .05$). Again, a one-tail t -test was utilized and findings indicate that students who entered college with prior college credits had significantly higher first year cumulative grade point averages than students who entered with no prior credits ($t_{221} = -4.54, p < .05$). A medium effect size of .55 (Cohen’s d) was consistent with the results from 1998. With similar results in 1998 and 2003 the null hypothesis was rejected in favor of the research hypothesis stating that students who come to college with prior college credits have greater academic performance during their first year than students without prior credit.

The second research hypothesis stated that a significant unique variance in first year GPA can be accounted for by prior college credits while controlling for the university admissions criteria of high school core GPA and ACT score. For

statistical analysis, the following null hypothesis was tested:

H₀₂: No statistically significant variance in first year college grade point average (GPA) can be accounted for by previous college credits while controlling for university admissions criteria (High School Core GPA and ACT Score).

Hierarchical multiple linear regression was used to explain the variance uniquely accounted for in the first year college grade point average by prior college credits. The control variables of high school core grade point average and ACT score were entered first. With regard to the 1998 data these control variables accounted for 37% ($R^2 = .37; F_{(2,363)} = 105.06$) of the variance in first year college grade point average (see Table 3). When the variable of interest, prior college credit, was entered into the regression model no additional variance was explained.

Table 3
Hierarchical Regression of First Year GPA on Control Variables and Pre-College Credits for 1998 Freshmen (N = 376)

Variable	R^2	R^2 Change	b	t -value	p -value
Control Variables					
High School GPA	.37	.37	.78	9.34	.01*
ACT Score			.03	3.07	.01*
Variable of Interest					
Previous College Credits	.37	.01	.01	1.46	.15
(Constant)			-.84		

* $p < .05$

For the 2003 data the control variables of high school core grade point average and ACT score accounted for 42% ($R^2 = .42; F_{(2,322)} = 118.51$) of the variance in first year college grade point average (see Table 4). When the variable of interest, prior college credit, was entered into the regression equation no significant additional variance could be accounted for in students’ first year cumulative

grade point average. Due to similar results in the 1998 and 2003 cohort groups the null hypothesis was accepted as tenable. This finding indicated that no significant variance in first year college grade point average (GPA) can be accounted for by previous college credits beyond what can be accounted for by the two university admissions criteria of high school core GPA and ACT Score.

Table 4
Hierarchical Regression of First Year GPA on Control Variables and Pre-College Credits for 2003 Freshmen (N = 338)

Variable	R^2	R^2 Change	b	t -value	p -value
Control Variables					
High School GPA	.42	.42	1.10	12.45	.01*
ACT Score			.03	2.28	.01*
Variable of Interest					
Previous College Credits	.43	.01	-.01	-.57	.57
(Constant)			-1.66		

* $p < .05$

Research hypothesis three stated that a statistically significant relationship exists between the number of prior college credits a student earns and academic retention. The following null hypothesis was tested:

H_{03} : There is no statistically significant relationship between the number of college credits earned prior to college

matriculation and retention to the sophomore year.

A point-biserial correlation was used to describe the relationship between the number of prior college credits earned and academic retention (from freshman to sophomore year). In 1998 a positive, low significant relationship, as defined by Hopkins (2002) was found ($r = .13, p < .05$) (see Table 5).

Table 5
Relationship between Prior College Credit and Retention for 1998 Freshmen (N = 376)

Prior College Credit	Not Retained ($n = 54$)		Retained ($n = 318$)	
	f	Percent	f	Percent
0	29	53.7	158	37.1
1 – 5	6	11.1	44	13.8
6 – 10	7	13.0	57	17.9
11 – 15	8	14.8	43	13.5
16 – 20	3	5.6	30	9.4
21 – 25	1	1.9	17	5.3
26 and greater	0	0.0	9	2.8

Note. $r_{pb} = .13; p < .05$

Similar to 1998, the 2003 data also indicated a positive, low significant relationship ($r = .17, p < .05$) (see Table 6). Therefore the

null hypothesis was rejected and the research hypothesis was accepted as being tenable.

Table 6
Relationship between Prior College Credit and Retention for 2003 Freshmen (N = 338)

Prior College Credit	Not Retained (n = 50)		Retained (n = 287)	
	<i>f</i>	Percent	<i>f</i>	Percent
0	30	60.0	99	34.5
1 – 5	5	10.0	29	10.0
6 – 10	6	12.0	65	22.6
11 – 15	6	12.0	38	13.2
16 – 20	1	2.0	29	10.0
21 – 25	1	2.0	21	7.3
26 and greater	1	2.0	6	2.1

Note. $r_{pb} = .17$; $p < .05$

The fourth research hypothesis stated that a relationship exists between the number of prior college credits earned and degree completion. For the purpose of statistical analysis, the following null hypothesis was tested:

H₀₄: No statistically significant relationship exists between the number of college

credits earned prior to college matriculation and degree completion.

In regard to the 1998 freshmen cohort, a positive, low, significant relationship (Hopkins, 2002) was found between the number of college credits earned and degree completion ($r = .17$, $p < .05$) (see Table 7).

Table 7
Relationship between Prior College Credit and Degree Completion for 1998 Freshmen (N = 376)

Prior College Credit	Did Not Earn Degree (n = 110)		Degree Earned (n = 266)	
	<i>f</i>	%	<i>f</i>	%
0	60	54.5	88	33.1
1 – 5	7	6.4	43	16.2
6 – 10	17	15.5	49	18.4
11 – 15	16	14.5	35	13.2
16 – 20	8	7.3	26	9.8
21 – 25	2	1.8	16	6.0
26 and greater	0	0.0	9	3.4

Note. $r_{pb} = .17$; $p < .05$

In 2003 a positive, low, significant relationship was once again discovered ($r = .27$, $p < .05$) (see Table 8). Based on the consistency in findings between the two cohort groups the null hypothesis was rejected. The research

hypothesis, stating that there is a relationship between the number of prior college credits earned prior to college matriculation and degree completion, was accepted as tenable.

Table 8
Relationship between Prior College Credit and Degree Completion for 2003 Freshmen (N = 338)

Prior College Credit	Did Not Earn Degree (n = 108)		Degree Earned (n = 229)	
	f	%	f	%
0	63	58.3	65	28.4
1 – 5	8	7.4	26	11.4
6 – 10	16	14.8	55	24.0
11 – 15	15	13.9	30	13.1
16 – 20	3	2.8	27	11.8
21 – 25	2	1.9	20	8.7
26 and greater	1	0.9	6	2.6

Note. $r_{pb} = .27$; $p < .05$

The final research hypothesis stated that a significant unique variance in final college GPA can be accounted for by prior college credits while controlling for the university admissions criteria of high school core GPA and ACT score. For statistical analysis, the following null hypothesis was tested:

H₀₅: No statistically significant variance in final college grade point average (GPA) can be accounted for by previous college credits while controlling for university admissions criteria (High School Core GPA and ACT Score).

To explain unique variance accounted for in final college grade point average by prior college credits, hierarchical multiple linear regression was used. The control variables of high school core grade point average and ACT score were entered first. For the 1998 cohort freshmen group, the variables of high school core GPA and ACT score accounted for 39% ($R^2 = .39$; $F_{(2,362)} = 114.44$) of the variance in final college grade point average (see Table 9). When prior college credit, the variable of interest, was entered into the equation, an additional one percent of the variance was explained.

Table 9
Hierarchical Regression of Final GPA on Control Variables and Pre-College Credits for 1998 Freshmen (N = 376)

Variable	R ²	R ² Change	b	t-value	p-value
Control Variables					
High School GPA	.39	.39	.78	9.74	.01*
ACT Score			.03	2.95	.01*
Variable of Interest					
Previous College Credits	.40	.01	.01	2.59	.01*
(Constant)			-.66		

* $p < .05$

For the 2003 cohort freshmen group the control variables of high school core grade point average and ACT score accounted for 35% ($R^2 = .35$; $F_{(2,311)} = 84.81$) of the variance in final college grade point average (see Table 10).

When prior college credit, the variable of interest, was entered into the regression model no additional variance was explained. Due to the conflicting findings between the two cohort freshmen groups, the null hypothesis stating that

no significant variance in final college GPA is accounted for by prior college credits while

controlling for university admission criteria was accepted.

Table 10

Hierarchical Regression of Final GPA on Control Variables and Pre-College Credits for 2003 Freshmen (N = 338)

Variable	R^2	R^2 Change	b	t -value	p -value
Control Variables					
High School GPA	.35	.35	.87	10.07	.01*
ACT Score			.02	2.24	.03*
Variable of Interest					
Previous College Credits	.35	.00	.01	.29	.77
(Constant)			-.65		

* $p < .05$

Conclusions/Implications/Recommendations

Based upon the findings from the study, it was concluded that students who enter college with prior college credit have greater academic performance, retention to their sophomore year, and degree completion rates than students with no prior college credit. Furthermore, it was concluded that this particular finding is a trend as indicated in consistent significant relationships in both the 1998 and 2003 cohort groups. This finding is consistent with previous literature on the connection between concurrent enrollment and academic performance, retention, and degree completion of students in colleges of agriculture (Smith & Garton, 2008). The finding poses interesting questions regarding concurrent enrollment. How much prior college credit should colleges and universities encourage? What is the linkage between types of concurrent enrollment and academic success in college? For example, does concurrent enrollment in a high school course that affords a number of college credits pose the same level of quality (as indicated by future academic success) as courses that students take for credit above and beyond their typical high school course load? It is recommended that future research be conducted on specific types of concurrent enrollment and the respective influence of each on college success.

One might posit whether the act of completing college credits prior to college seemingly influences student success, or if said performance can be attributed to a self-selected

group of students who are academically talented and thus more likely to experience greater academic success. To investigate this phenomenon, research hypotheses two and five attempted to control for the variables associated with a group of students who might enter college at higher rates of performance in the first place, high school core GPA and ACT scores. Statistically significant unique variance was noted for the 1998 cohort group with regard to final college grade point average; however, no other unique variance was accounted for by prior college credit. The implications of such findings suggest that prior college credit does not provide a significant contribution in prediction models designed to predict students' college success. In essence, no additional information can be gained by including prior college credit in such models; high school core GPA remains the best predictor of our students' success in college. This conclusion remains consistent with prior research conducted (Garton, Ball, & Dyer, 2002; Smith & Garton, 2008).

It is recommended that further research be conducted to determine the point of maximum return for both students and colleges in terms of the amount and nature of concurrent enrollment students should obtain. At what point do students and colleges experience "diminished returns" on prior college credit? Furthermore, it is recommended that future research investigate the function of motivation on academic performance and retention as it applies to students with prior college credit.

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