WKU Freshmen Performance in Foundational Courses: Implications for Retention and Graduation Rates

ABSTRACT

In the study of higher education, few topics receive as much attention as retention and graduation rates, and many models have been produced to identify the factors that most influence the outcomes. At Western Kentucky University, the Office of Institutional Research examined over 100 variables to produce a statistical model for retention, finding that a student's first term grade point average most strongly predicted outcomes. In a separate analysis, the Mathematics Department arrived at the same conclusion.

Since college grades most powerfully predict retention and graduation rates, this study asks: Which grades? Does a grade earned in one course have a stronger relationship with future success than a grade earned in another course? For degree seeking freshmen at Western Kentucky University, what do the historical data show?

This study examines the relationship between the grades earned in selected entry level courses and the retention and graduation rates of baccalaureate seeking freshmen. To clarify the relationships that may exist, it presents and considers the performance of freshmen in the courses and their academic background as measured by high school grade point average and composite ACT score. Simple linear regressions that control for these factors help distinguish two categories of courses, the "selective," where retention and graduation rates are more a reflection of the students in the courses, and the "formative," where student success in the course is a major predictor of future retention and graduation. The study concludes with a proposal for a program that may assist those committed to improving retention and graduation rates for at Western Kentucky University.

INTRODUCTION

Many publications have addressed student retention and graduation rates, and statistical models developed over the past several decades have found general agreement on the variables that play the strongest statistical role in predicting student success. These variables include high school grade point average, standardized test scores, first generation student status, as well as economic and financial aid variables. Not surprisingly, models that update information to include post enrollment data (college grades, financial aid, housing, and other college experience factors) provide significantly more predictive power than models based solely on pre-college data. At Western Kentucky University, the Office of Institutional Research and the Mathematics Department in separate studies found that first term grade point average most strongly predicted retention outcomes.

This study focuses on the grades earned by WKU bachelor's degree seeking freshmen in 29 entry level courses taken most frequently by WKU students. The purpose of the study is to 1) clarify student performance in these courses, 2) examine the relationship between student performance in each course and retention / degree attainment, 3) identify which courses best serve as predictors for eventual student success and also identify students whose success may be in jeopardy.

> *"So what if you flunk algebra? Who doesn't? But if you flunk Communication, something's wrong."*
>
> —WKU Freshman, Fall 2010

As will be shown, our freshman is misinformed regarding Math 116 passing rates. However, the remark points to a concept worth exploring. Does failure in a course with a high passing rate ("easy") more significantly predict a student's inability to graduate than failure in a course with a lower passing rate ("difficult")? Does success in a "hard" course predict a likely graduation?

This study addresses these questions, discusses the concepts uncovered by the analysis, and suggests the possible implications for university policies and practices designed to improve graduation rates at Western Kentucky University.

METHODS

For the retention analysis, I examined students enrolled as freshmen from fall 2002 through spring 2008 and determined if they became sophomores within two years. For graduation rates it is necessary to use an older sample. WKU baccalaureate students have graduation rates of approximately 25%, 45%, and 49% for four, five, and six years respectively. Degree completion by the spring of 2010 represents a five-year graduation for students beginning fall 2005, a six-year graduation for those beginning in fall 2004, and longer for those students beginning earlier than fall 2004. With this in mind the study selected baccalaureate seeking freshmen taking courses from fall 2002 through spring 2005. For those who began prior to fall 2004, a six-year graduation rate was used.

The study consists of four parts:

1) A discussion of freshmen enrollment and grades earned by baccalaureate seeking students in the identified courses for each term from fall 2002 through spring 2008.
2) The statistics with respect to their advancement to sophomore classification grouped by the grades they earned and whether they passed the class (defined here as A/B/C) or did not (D/F).
3) For the above freshmen taking the courses between fall 2002 and spring 2005, an examination of the graduation rates for students grouped by the grades they earned and whether they passed the class or did not.
4) Two linear regression models for each course, one for successful retention to sophomore status and one for graduation with a bachelor's degree. In both, the dependent variable (success) is determined by three independent variables (the course grade, student high school GPA, and student ACT composite score).

The calculations of a linear regression allow one to measure the effect of one variable (the student's performance in the course) on another (retention or graduation) while holding the other variables constant (high school GPA and ACT composite score). The magnitude of the β coefficient expresses the amount of this influence numerically.

The focus on a simple result (retention or not, graduation or not) with a small number of independent variables allows for readily understood regression models. The following two models, one for retention and one for graduation, are produced for each course:

Retention to Sophomore = Intercept + β1 (Course Success) + β2(HS GPA) + β3 (Comp ACT) + E

Degree Completion = Intercept + β1 (Course Success) + β2(HS GPA) + β3 (Comp ACT) + E

where E is an error term.

The dependent variables are assigned binary values, 1 for success, and 0 for lack of success, which causes the model's result (the expected value of the variable) to be the probability that the student will succeed. This allows for a straightforward explanation of the β values produced in each regression.

β1 – the increase in the probability of success when the student succeeds in the course

β2 – the increase in the probability of success when the high school GPA is raised by 1 point

β3 – the increase in the probability of success when the ACT score is raised by 1 point

While a logistic regression is frequently used for binary variables indicating a particular event, its mathematics involve logarithms and probability ratios that introduce a complexity not well suited for the discussion here. A logistic regression yields the same statistical conclusions.

RESULTS

Table 1 shows the lower level courses with enrollment exceeding 300 freshmen per year. For each of the courses it provides 1) the enrollment for the course for the time period, 2) the mean grade earned in each course, and 3) the passing rate for the course where passing is considered a grade of C or above. Students who audited the course (grade "AU") or withdrew from the course with a grade of W were excluded from the analysis.

In terms of grades awarded, students experience the most difficulty with the Biology courses (113 and 131), Geography 100, and Math 116E. Grades and passing rates do NOT serve as a direct measure of course difficulty, as exemplified by Math 116 and 116E, *where the lower scores are more a reflection of the students enrolled than the difficulty of the course*. (116E is specifically designed for students with math skills deemed insufficient for the regular 116.) With twice the contact time for the same material, 116E is in fact an "easier" course whose students would fare worse in the other class. A similar example would be Geography 100 and Geography 110, where the former's lower mean grades awarded may be a reflection of the students as much as the difficulty of the course. As shown in Table 2, Geography 110 students had a mean high school grade point average of 3.28 and mean ACT composite of 21.9, compared to 3.16 and 21.1 for Geography 100.

Students earn the highest grades and enjoy the highest passing rates in Physical Education 101 (93.5%) and University Experience 175 (90.1%). Students also perform well in English 100 (89.0%) and English 200 (88.3%), as well as the two Communication courses (145 and 161 at 84.2% and 88.6%), Theater 151 (89.1%) and Personal Health 100 (86.4%).

Table 1: The Courses
Enrollment and Performance – Baccalaureate Degree Seeking Freshmen
Fall 2002 – Spring 2008

Course	Students*	Mean Grade	Pass Rate**
Physical Education 101	3496	3.44	93.5%
University Experience 175	5085	3.35	90.1%
English 100	10202	2.90	89.0%
Communication 161	6001	2.93	88.6%
English 200	3587	2.90	88.3%
Personal Health 100	4343	2.76	86.4%
Theater 151	2151	2.75	84.7%
Communication 145	6031	2.80	84.2%
Political Science 110	1744	2.73	83.9%
Psychology 199	1224	2.64	83.7%
Cons. Family Sci. 111	1669	2.68	83.5%
Spanish 102	1160	2.64	82.7%
Art 100	2920	2.79	82.4%
Music 120	5426	2.68	82.1%
Astronomy 104	4038	2.45	79.7%
Mathematics 117	639	2.55	79.2%
Mathematics 116	4397	2.51	78.8%
Comp. Inf. Sys 141	1843	2.49	78.1%
Psychology 100	8994	2.49	77.7%
Mathematics 109	2584	2.43	77.3%
Sociology 100	6012	2.44	77.3%
History 120	6748	2.22	75.2%
History 119	5793	2.23	74.8%
Economics 202	1296	2.16	73.1%
Mathematics 116E	1253	2.14	73.1%
Geography 110	1287	2.24	73.0%
Geography 100	2181	2.19	71.5%
Biology 113	4706	2.13	69.1%
Biology 131	1191	1.73	57.1%

*Fall and Spring semesters only. Counts exclude students who withdrew with a grade of W or audited the course (grade "AU").
**A/B/C grades are considered passing. D/F are considered not passing.

To allow for a better interpretation of the results that follow, we should consider the relative academic strengths of the students taking the different courses. Table 2 shows the means for the pre-college academic variables (high school grade point average and composite ACT score) for the students taking each course. The slightly higher values relative to the institutional averages are the result of the sample's restriction to students seeking baccalaureate degrees. The GPA/ACT Index combines the two scores to produce a single number where each receives equal weight.

Index = [(Course Mean GPA/All GPA Mean) + (Course Mean ACT/All ACT Mean) – 1] X 100.

Table 2 – Student High School GPA and ACT Composite Scores by Course
Baccalaureate Degree Seeking Freshmen
Fall 2002 – Spring 2008

Course	High School GPA	ACT Composite	GPA/ACT Index
Mathematics 117	3.42	22.9	112.1
Spanish 102	3.42	22.4	109.8
Mathematics 116	3.41	22.4	109.5
English 200	3.31	21.9	104.1
Political Science 110	3.24	22.2	103.3
Geography 110	3.28	21.9	103.2
Communication 161	3.26	21.7	101.6
Physical Education 101	3.25	21.7	101.3
Communication 145	3.26	21.5	100.7
History 120	3.26	21.5	100.7
Psychology 199	3.29	21.3	100.7
Biology 131	3.36	20.8	100.5
History 119	3.22	21.7	100.4
University Experience 175	3.24	21.5	100.1
Astronomy 104	3.21	21.5	99.1
Cons. Fam. Science 111	3.31	20.8	98.9
Psychology 100	3.24	21.2	98.7
Music 120	3.23	21.2	98.3
Art 100	3.26	20.9	97.9
Comp. Inf. Sys. 141	3.21	21.1	97.3
Theater 151	3.24	20.9	97.2
Personal Health 100	3.25	20.8	97.1
Economics 202	3.21	21.0	96.8
English 100	3.22	20.8	96.2
Sociology 100	3.20	20.9	96.0
Geography 100	3.16	21.1	95.7
Biology 113	3.18	20.8	94.5
Mathematics 109	3.18	20.7	94.5
Mathematics 116E	3.18	20.6	94.0

Table 3 provides the rates for which students earning the specific grades in the courses successfully complete their work as freshmen and become sophomores. For instance, 90% of the students who took Art 100 and earned an A successfully became sophomores. For those who receiving an F in Art 100, this number is 38%.

TABLE 3: Freshmen Attaining Sophomore Classification
Rates by Course / Course Grade
Baccalaureate degree seeking Freshmen Fall 2002 – Spring 2008

Course	A	B	C	D	F	Pass	Fail
Art 100	90%	85%	78%	67%	38%	86%	51%
Astronomy 104	92%	87%	82%	66%	34%	87%	52%
Biology 113	90%	86%	79%	67%	34%	84%	49%
Biology 131	93%	86%	81%	73%	53%	86%	59%
Cons. Fam. Science 111	88%	82%	78%	61%	26%	83%	46%
Comp. Inf. Sys. 141	90%	88%	80%	70%	42%	86%	55%
Communication 145	89%	82%	69%	62%	25%	83%	38%
Communication 161	90%	83%	71%	54%	21%	84%	35%
Economics 202	94%	93%	88%	86%	49%	91%	73%
English 100	87%	81%	70%	50%	25%	81%	34%
English 200	94%	91%	87%	78%	42%	92%	59%
Geography 100	92%	87%	78%	67%	39%	85%	53%
Geography 110	95%	89%	88%	75%	39%	90%	58%
History 119	91%	86%	79%	65%	27%	84%	44%
History 120	91%	88%	80%	65%	34%	85%	49%
Mathematics 109	87%	86%	80%	70%	37%	84%	52%
Mathematics 116	90%	88%	84%	76%	51%	88%	63%
Mathematics 116E	88%	87%	80%	77%	46%	84%	58%
Mathematics 117	96%	89%	92%	84%	63%	92%	71%
Music 120	90%	85%	73%	64%	29%	85%	44%
Physical Education 101	83%	77%	67%	56%	41%	81%	42%
Personal Health 100	90%	83%	74%	56%	23%	83%	41%
Political Science 110	90%	786	80%	65%	29%	86%	48%
Psychology 100	88%	81%	74%	59%	28%	82%	42%
Psychology 199	91%	86%	80%	57%	36%	86%	45%
Sociology 100	89%	85%	75%	63%	28%	83%	46%
Spanish 102	95%	88%	83%	71%	46%	89%	56%
Theater 151	91%	86%	81%	75%	36%	87%	57%
University Experience 175	82%	67%	52%	39%	19%	77%	25%

Overall WKU retention is approximately 73%.

At first glance one might speculate that the results simply reflect course difficulty, where success in "easy" courses means little but failure indicates a problem, and success in "difficult" courses bodes well for a student, but failure means little. Our freshman's remark appears to have some validity.

"EASY"	**"DIFFICULT"**
Success has less meaning Failure has more meaning	Success has more meaning Failure has less meaning
English 100 (D/F = 34%)	Economics 202 (A= 94%)
Communications 161 (D/F = 35%)	Spanish 102 (A = 95%)
University Experience 175 (D/F = 25%)	English 200 (A = 94%)

Is the situation really this simple?

No.

While some courses fit this concept (Math 117), many do not. For starters, English 200 and Spanish 102 (passing rate of 82.7% and 88.3% respectively) are not "difficult" courses. As already noted, we need look no further than Math 116 compared to Math 116E to see that the performance statistics for a course cannot assess its degree of difficulty.

As noted with Math 116 and 116E, *the nature of the students in the courses must be taken into account.* English 200 has freshmen who have either completed or qualified out of taking English 100. Spanish 102 has strong results because the students who gain access to this course as freshmen tend to be honors students. Table 2 provides the relative academic strength of the students enrolling in the courses in terms of high school grade point average and ACT composite score.

Successful graduation represents a substantially higher level of achievement (WKU overall 49% success rate) than becoming a sophomore (73%), so we would expect more dramatic results. We get them. Table 4 shows the graduation rates of the students earning the grades in the same courses. Once again our freshman's comment about Math 116 appears to have some validity. While freshmen who received a D or F in Math 116 still had a graduation rate of 35%, those earning such grades in Communication 145 and 161 had graduation rates of 17% (C145) and 14% (C161). Freshmen who received a D or F in English 100 had a graduation rate of 14%.

Poor performance in University Experience 175 has dire consequences for the likelihood of both retention and graduation. Even the grade of B drops both the retention rate (67%) and graduation rate (34%) below the university averages of 73% and 49%. Students receiving a D or F in UC 175 had an 8% graduation rate.

TABLE 4: Graduation Rates by Course Grades / Completion
Baccalaureate degree seeking Freshmen Fall 2002 – Spring 2005

	Grade Earned					Completion*	
	A	B	C	D	F	Pass	Fail
Art 100	67%	56%	45%	37%	9%	60%	21%
Astronomy 104	76%	67%	51%	31%	14%	64%	23%
Biology 113	76%	59%	48%	30%	11%	59%	20%
Biology 131	72%	62%	59%	39%	27%	63%	31%
Cons. Family Sci. 111	76%	56%	40%	29%	14%	58%	23%
Comp. Inf. Sys. 141	77%	72%	54%	46%	22%	67%	34%
Communication 145	73%	56%	38%	27%	11%	59%	17%
Communication 161	72%	57%	41%	25%	6%	59%	14%
Economics 202	74%	66%	58%	59%	22%	64%	46%
English 100	67%	53%	38%	21%	10%	56%	14%
English 200	77%	61%	51%	42%	11%	66%	24%
Geography 100	76%	64%	49%	32%	15%	62%	22%
Geography 110	83%	67%	50%	41%	25%	66%	33%
History 119	74%	61%	46%	30%	8%	58%	18%
History 120	74%	68%	51%	33%	13%	62%	22%
Mathematics 109	68%	59%	54%	41%	14%	60%	27%
Mathematics 116	76%	68%	61%	49%	21%	68%	35%
Mathematics 116E	71%	71%	44%	52%	25%	60%	39%
Mathematics 117	70%	63%	55%	57%	26%	63%	45%
Music 120	70%	62%	41%	30%	12%	60%	19%
Physical Education 101	63%	49%	45%	31%	12%	59%	18%
Personal Health 100	71%	60%	45%	21%	9%	60%	16%
Political Science 110	74%	64%	45%	26%	8%	62%	17%
Psychology 100	72%	54%	43%	25%	10%	57%	17%
Psychology 199	75%	51%	43%	9%	12%	56%	10%
Sociology 100	68%	58%	44%	27%	8%	57%	18%
Spanish 102	78%	68%	58%	22%	20%	70%	21%
Theater 151	67%	60%	53%	41%	10%	61%	26%
University Experience 175	62%	34%	22%	12%	6%	54%	8%

Graduation rates for the set of freshmen who took the course and received the grade shown.
*Completion: Pass = A/B/C, Fail = D/F.

These matters all suggest that it is necessary to understand each course in its own context and recognize the differing academic attributes of the students involved.

What happens to the relationships when the statistics control for student aptitude by including their high school grade point averages and ACT scores?

Course Regressions – Taking Student Ability into Account

To clarify the relationship between student performance in a course and retention to sophomore / graduation rates, I conducted a simple linear regression for each course with a binary dependent variable for the student's success (1 – success, 0 – no success). For each regression model the three independent variables are 1) success in the course, 2) high school GPA, and 3) composite ACT score.

Sparing the reader the mathematics, the R-squared calculation is a ratio that measures the degree to which the model explains the outcomes. Efforts to produce models that capture all of the factors influencing a particular outcome will seek to maximize this ratio. This study focuses on the influence of three factors alone (those listed above), ignoring many others (financial aid, living on campus, ethnicity, etc.). As a result, much of the variation remains unexplained, which leads to rather small R-squared calculations (about 0.10 to 0.20). This does not invalidate the comparisons and distinctions drawn from the results.

For each course we have the following sum:

Number	Interpretation	Share of Influence
Intercept	(being in the course – approx.)	Not applicable
+ β1	(performance in the course)	SS % = percentage of Perf. role
+ β2	(high school GPA)	SS % = percentage of GPA role
+ β3	(composite ACT score)	SS % = percentage of ACT role
Probability of Success		The three above add to 100%

The results of the regressions are shown in Table 5 (reaching the sophomore level) and Table 6 (completion of degree). When included in a model with performance in a college course and high school GPA, the ACT composite score played little to no statistical role (as measured by the model sum of squares) and often lost statistical significance. Put another way, when examining the impact on retention and graduation rates, success in the course and the high school GPA dwarfed the influence of the ACT score. With the exception of the ACT score, for all of the regressions, student populations well exceeded the sizes necessary for statistical significance (p values well under 0.001).

The regression results of Table 5 are consistent with the summary statistics of Table 3 and shed further light on what is occurring, in particular the relative importance of the three independent variables with respect to whether a student successfully advanced to the sophomore level. The SS column for each of variable represents its percentage of the model sum of squares calculation

in the regression. In other words, it describes that variable's share of the model's explanation of the outcome.

The regressions produce a best fit line that starts with an intercept value one could loosely interpret as the "starting point" where the student has enrolled in the course before we add the values of their high school grades, ACT score, and success in the course. This intercept will tend to be higher for courses whose students have higher retention/graduation rates overall, such as Economics 202, Math 117, or English 200. However, we are now controlling for the strength of the students as measured by their high school GPA and ACT score, and these adjustments will alter some of the relative positions. It is important to look at all of the values.

An example contrasting different courses leads to the fundamental distinction drawn by the study. We are primarily interested in the intercept and student performance ($\beta 1$), noting that these numbers have taken the other variables into account. From Table 6, for degree completion we have:

	Economics 202	Communication 145
Intercept:	- 0.154	- 0.641
$\beta 1$:	0.109	0.316

As mentioned, the intercept provides a relative value for a starting point. The value of $\beta 1$ tells us the value of the student's success in the course. For Economics 202, the simple fact that the student is in the course provides a good starting point for the chances of retention and graduation, but the smaller $\beta 1$ suggests less impact of the grade earned in the course. In other words, the students who don't do well in Economics 202 still tend to stay, advance, and graduate.

By contrast, in Communication 145 the intercept is quite low, but the higher value of $\beta 1$ tells us that success in the course has a stronger relationship with improved graduation rates. A high grade vs. low grade in the Communication course "means more." As we saw in Table 4, students who do not succeed in this course have minimal chances of graduating.

"Selective and Formative" – Distinguishing Two Categories of Courses

This example illustrates two categories of courses into which some of the other courses in the study also belong. The first category, the Selective, is distinguished by regression lines with relatively high intercepts yet more modest $\beta 1$ coefficients, where the students participating have passed a screening process either formal (English 200, Math 116 or 117) or informal yet very real (Spanish 102). Retention and graduation rates are very high for top grade earners, and rates fall slowly with lower grades earned. The second category, the Formative, features regression lines with lower intercepts, yet the retention and graduation rates rise significantly as the students earn higher grades. Examples include English 100, the Communication courses, and University Experience 175. Table 5 shows the regression results with the courses sorted by the value of the coefficient. While not precise, the sort produces an overall / approximate ranking from the "Formative" courses to the "Selective" courses. Note the increasing intercept values.

TABLE 5: Course Regressions - Sophomore Classification
Baccalaureate degree seeking Freshmen Fall 2002 – Spring 2008
Dependent Variable – Attaining Sophomore Status

	N	R^2	Intercept	Success		HS GPA		ACT Comp	
				β_1	SS	β_2	SS	β_3	SS
Univ. Experience 175	4723	0.173	-0.435	**0.430**	70%	0.169	27%	0.010	3%
Communication 161	5465	0.171	-0.063	**0.429**	85%	0.113	14%	0.005	1%
English 100	9507	0.144	-0.091	**0.424**	84%	0.125	15%	0.003	1%
Communication 145	5524	0.171	-0.082	**0.382**	84%	0.127	15%	0.005	1%
Physical Educ 101	3240	0.130	-0.170	**0.382**	62%	0.158	37%	0.004	1%
Personal Health 100	3925	0.159	-0.091	**0.373**	81%	0.116	16%	0.008	3%
Psychology 199	1102	0.153	0.192	**0.369**	88%	0.120	11%	N/A	1%
History 119	5242	0.171	0.138	**0.352**	92%	0.111	8%	N/A	0%
Music 120	4955	0.161	0.048	**0.344**	86%	0.124	14%	N/A	0%
Psychology 100	8235	0.168	0.001	**0.339**	85%	0.152	15%	N/A	0%
Astronomy 104	3671	0.148	0.228	**0.327**	91%	0.091	9%	N/A	0%
Political Science 110	1578	0.144	0.156	**0.326**	84%	0.121	16%	N/A	0%
Art 100	2680	0.132	0.205	**0.322**	90%	0.087	9%	N/A	1%
Sociology 100	5404	0.139	0.129	**0.319**	90%	0.092	9%	0.004	1%
English 200	3337	0.108	0.467	**0.313**	96%	0.040	3%	N/A	1%
Cons. Fam. Sci. 111	1516	0.081	0.143	**0.308**	88%	0.097	12%	N/A	0%
Biology 113	4257	0.145	0.196	**0.307**	93%	0.094	7%	N/A	0%
History 120	6134	0.163	0.074	**0.305**	84%	0.144	16%	N/A	0%
Geography 100	1992	0.139	0.245	**0.294**	90%	0.112	10%	N/A	0%
Comp. Inf. Sys 141	1646	0.121	0.314	**0.293**	91%	0.094	9%	N/A	0%
Mathematics 109	2378	0.106	0.302	**0.291**	95%	0.062	5%	N/A	0%
Geography 110	1169	0.147	0.320	**0.273**	90%	0.102	10%	N/A	0%
Spanish 102	1095	0.133	0.193	**0.253**	85 %	0.109	15%	N/A	0%
Theater 151	1954	0.098	0.245	**0.253**	83%	0.079	15%	0.005	2%
Mathematics 116E	1139	0.087	0.433	**0.218**	80%	0.120	14%	N/A	6%
Biology 131	1103	0.118	0.108	**0.217**	81%	0.138	19%	N/A	0%
Mathematics 116	4085	0.088	0.304	**0.200**	81%	0.118	18%	N/A	0%
Mathematics 117	573	0.072	0.638	**0.197**	98%	0.022	2%	N/A	0%
Economics 202	1115	0.056	0.645	**0.172**	93%	0.047	6%	N/A	1%

N/A = not statistically significant.
β_1: the probability increase if the course is passed
β_2: the probability increase with a 1.0 increase in high school GPA
β_3: the probability increase with a 1.0 point increase in ACT composite score

TABLE 6: Course Regressions - Graduation

Baccalaureate degree seeking Freshmen Fall 2002 – Spring 2005
Dependent Variable – Degree Completion

	N	R^2	Intercept	Success		HS GPA		ACT Comp	
				β_1	SS	β_2	SS	β_3	SS
English 200	1408	0.114	-0.332	**0.363**	69%	0.170	30%	N/A	1%
Spanish 102	255	0.217	-0.601	**0.358**	77%	0.191	20%	N/A	3%
Psychology 199	543	0.219	-0.864	**0.347**	52%	0.301	48%	N/A	0%
Astronomy 104	1726	0.159	-0.421	**0.339**	75%	0.187	25%	N/A	0%
Personal Health 100	1837	0.166	-0.698	**0.338**	63%	0.210	33%	0.013	4%
English 100	4821	0.125	-0.655	**0.333**	56%	0.218	43%	N/A	1%
Communication 161	2772	0.165	-0.706	**0.330**	54%	0.263	45%	0.005	1%
Art 100	1290	0.123	-0.453	**0.325**	67%	0.199	33%	N/A	0%
Communication 145	2795	0.154	-0.641	**0.316**	62%	0.191	33%	0.013	5%
Univ. Experience 175	2112	0.171	-0.922	**0.314**	43%	0.278	54%	0.011	3%
History 119	2863	0.169	-0.507	**0.307**	71%	0.228	29%	N/A	0%
Political Science 110	633	0.194	-0.615	**0.305**	63%	0.260	37%	N/A	0%
Biology 113	2281	0.176	-0.526	**0.302**	77%	0.187	21%	0.009	2%
Music 120	2252	0.150	-0.508	**0.295**	67%	0.224	32%	N/A	1%
History 120	3255	0.181	-0.564	**0.295**	68%	0.241	32%	N/A	0%
Sociology 100	2575	0.155	-0.586	**0.293**	65%	0.203	32%	0.010	3%
Geography 100	1135	0.166	-0.453	**0.292**	71%	0.209	29%	N/A	0%
Psychology 100	4293	0.176	-0.641	**0.281**	64%	0.247	35%	0.005	1%
Physical Educ 101	1875	0.139	-0.695	**0.274**	34%	0.280	65%	N/A	1%
Mathematics 109	1120	0.123	-0.459	**0.260**	70%	0.195	28%	N/A	2%
Comp. Inf. Sys 141	681	0.121	-0.136	**0.256**	70%	0.219	28%	N/A	2%
Biology 131	501	0.174	-0.566	**0.246**	66%	0.121	21%	0.025	13%
Geography 110	443	0.122	-0.240	**0.244**	65%	0.212	35%	N/A	0%
Theater 151	873	0.113	-0.483	**0.242**	54%	0.210	44%	N/A	2%
Mathematics 116	2230	0.118	-0.347	**0.234**	67%	0.231	33%	N/A	0%
Cons. Fam. Sci. 111	606	0.181	-0.882	**0.188**	43%	0.243	47%	0.021	10%
Mathematics 117	196	0.072	-0.057	**0.157**	53%	0.190	46%	N/A	1%
Mathematics 116E	260	0.055	-0.046	**0.146**	55%	0.169	45%	N/A	0%
Economics 202	504	0.080	-0.154	**0.109**	38%	0.207	62%	N/A	0%

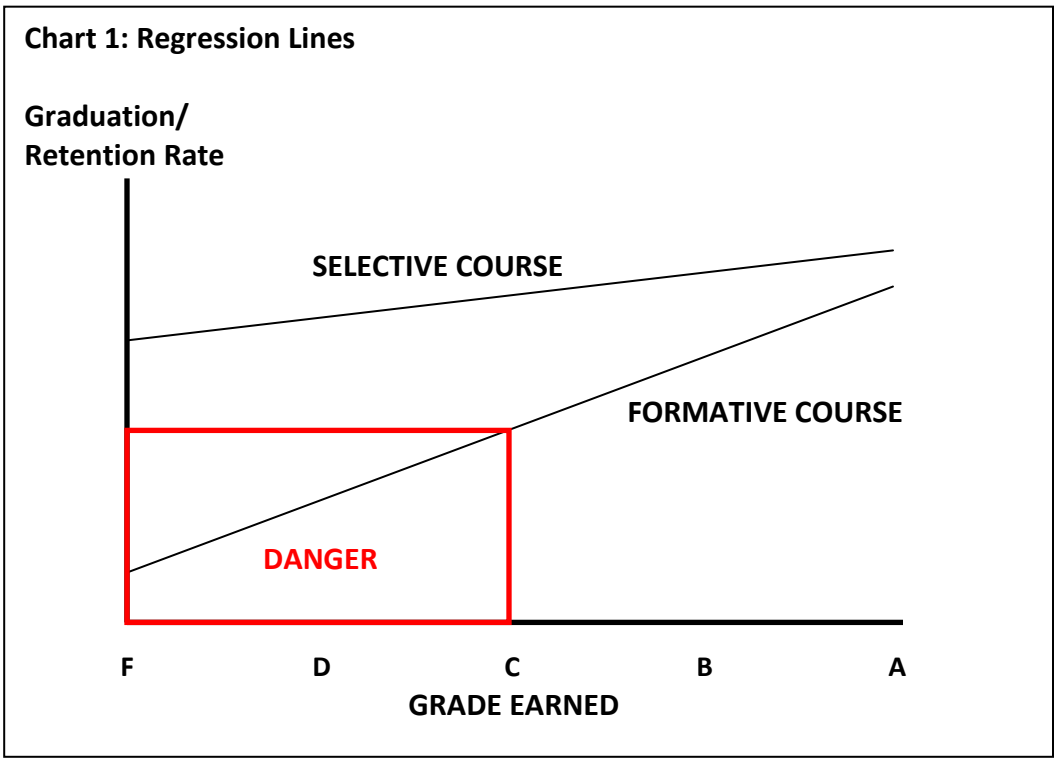
N/A = not statistically significant.

β_1: the probability increase if the course is passed

β_2: the probability increase with a 1.0 increase in high school GPA

β_3: the probability increase with a 1.0 point increase in ACT composite score

Chart 1 illustrates the two different types of regression lines and clearly represents the distinction between the behaviors of the two categories.



The data for University Experience 175 warrant further discussion. When comparing the students who enroll in the course to those who do not, the statistics are essentially the same. This holds for high school grades and ACT scores as well as retention and graduation rates. However, for those who do enroll, the data for University Experience 175 are compelling in terms of identifying freshmen who may be at risk. Students who do poorly have abysmal chances of success, and further, it's 90.1% percentage of passing grades and mean grade awarded of 3.35 *suggest a course where failure may be less a function of can or can't and more a function of will or won't*. In either case, students with performance issues in University Experience 175 warrant the attention of those seeking to improve the university's retention and graduate rates.

ASSOCIATE DEGREE SEEKERS

This study focuses on baccalaureate degree seeking freshmen, but the same analysis can be applied to those seeking associates degrees. Table 7 shows the retention to sophomore statistics for freshmen seeking associates degrees based upon their performance in selected developmental courses. Interestingly, the distinction between "selective" and "formative" behavior exists for these courses as well, with the mathematics courses, in particular MA 116C, showing results consistent the selective group, while English 055C, Reading 080C, and UCC 175C show behavior of the formative group. Table 8 in the appendix shows the regression results for the retention of associate degree freshmen in each course.

TABLE 7: Freshmen Attaining Sophomore Classification Rates by Course / Course Grade
Associates degree seeking Freshmen Fall 2002 – Spring 2008

Course	A	B	C	D	F	Pass	Fail
DENG055C	67%	52%	37%	31%	10%	53%	14%
DMA 055C	65%	62%	57%	41%	16%	61%	23%
DMA 096C	78%	75%	65%	55%	28%	72%	36%
DRDG 080C	71%	64%	45%	28%	8%	58%	15%
ENGL 100C	76%	72%	62%	45%	26%	71%	31%
MA 100C	73%	72%	72%	45%	34%	72%	38%
MA 116C	82%	86%	83%	71%	40%	84%	56%
MATH 100	73%	78%	75%	64%	29%	75%	40%
SPCH 145C	85%	70%	56%	36%	18%	69%	23%
SPCH 161C	75%	71%	66%	39%	17%	81%	34%
UCC 175C	62%	45%	32%	28%	6%	52%	12%

Overall WKU associate retention is approximately 54%.

CONCLUSION

While a student's grade in any college course will tend to indicate overall academic capability and commitment, the grades earned in some courses may provide better insight than others. This study focused on the performance of WKU baccalaureate seeking freshmen in many of the most popular entry level courses they take during their first year at the university. It computed the retention and degree completion statistics for students earning each grade in each course to identify groups with particularly high and particularly low levels of success. It then computed linear regression models for each individual course including student ability variables of high school grade point average and ACT scores.

It is important to recognize that the relationships examined in this study are not causal. Placing large numbers of students into Economics 202, Geography 110, or Spanish 102 will not raise

retention or graduation rates. Efforts to elevate the grades awarded or course passing rates of English 100 or University Experience 175 would be chasing symptoms, not causes, of the underlying factors impairing retention and graduation. Rather, the statistics for the courses in this study serve as pointers, as a means of identifying students facing issues that undermine their continued enrollment.

The results suggest that student performance in Communication courses 145 and 161, English 100, and especially University Experience 175 can serve to identify students who are at risk of failing to reach their sophomore year and therefore failing to graduate. While these courses enjoy rather high passing rates, the number of students who don't succeed in them exceeds 500 students per year in an institution that starts approximately 2,250 bachelor's degree seeking freshmen per academic year.

PROPOSAL FOR CONSIDERATION

A policy requiring most students to participate in University Experience or the individual college equivalent combined with an early warning program may allow the institution to intervene and prevent the loss of freshmen. While faculty are best suited to design this program, it would likely involve rigorous tracking of class attendance, tardiness, completion of assignments, and other measures of student engagement with the intent to identify at risk students in the first few weeks of the fall semester. Faculty, counselors, or other designated support personnel, equipped with this information, could initiate communication with the students before they are lost. The results found here indicate that the course is best targeted to students more likely to be at risk. The efficiency of such a policy would likely be improved if this requirement did not apply to students with sufficiently strong academic credentials.

The study also suggests that three other courses, Communication 145 and 161, and English 100, are good candidates for an enhanced early progress tracking program that flags attendance or other issues in the first few weeks of the semester.

FINAL REMARKS

The narrative here is a first step in uncovering some of the dynamics represented by the numbers in the tables contained in this report. Further examination may lead to additional insights as well as questions regarding the challenges facing WKU students during their first year on campus. This study fits inside of other efforts seeking to identify possible strategies for improving the retention and graduation rates of degree seeking students at Western Kentucky University.

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APPENDIX – Regression Results for Associates Degree Seeking Freshmen

TABLE 8: Freshmen Attaining Sophomore Classification
Course Regressions
Associates degree seeking Freshmen Fall 2002 – Spring 2008

	N	R^2	Intercept	Success		HS GPA		ACT Comp	
				β_1	SS	β_2	SS	β_3	SS
DENG055C	2163	0.139	-0.455	0.316	79%	0.103	13%	0.027	8%
DRDG 080C	2414	0.165	-0.433	0.340	83%	0.096	10%	0.027	7%
UCC 175C	1484	0.146	-0.418	0.356	79%	0.101	12%	0.021	9%
SPCH 161C	545	0.183	0.200	0.468	99%	N/A	1%	N/A	0%
SPCH 145C	652	0.196	-0.211	0.413	88%	0.077	7%	0.018	5%
ENGL 100C	1589	0.141	0.153	0.363	96%	0.068	4%	N/A	0%
MATH 100	109	0.140	0.073	0.331	89%	N/A	1%	N/A	10%
DMA 055C	1375	0.158	-0.215	0.323	89%	0.088	6%	0.019	5%
MA 100C	634	0.127	0.161	0.320	96%	0.061	3%	N/A	1%
DMA 096C	636	0.142	0.094	0.312	88%	0.128	12%	N/A	0%
MA 116C	321	0.096	0.733	0.302	95%	N/A	3%	N/A	2%

N/A – not statistically significant