ABSTRACT
        A study was conducted to determine whether a specific set of
factors could be used to predict a student's success in completing an
introductory English course in the general education curriculum at a small
southern university. The sample included first-time freshmen enrolled during
seven semesters (n=942). Variables were: (1) completion of the prerequisite
requirement for the English course; (2) student age; (3) ACT Assessment
composite score; (4) ACT reading score; (5) part-time or full-time status;
(6) public or nonpublic state high school; (7) gender; and (8) traditional or
General Educational Development high school diploma. Very few statistically
significant relationships were found between various predictor variables and
student success or failure. The study did not validate the need for current
prerequisite for first college English courses. Results suggest that the
current developmental education may not be providing the preparation needed
for successful completion of beginning English courses. The model did confirm
prior findings that ACT subscores are a valid predictor of success. (Contains
15 references.) (SLD)

Using Discriminant-Function Analysis to Predict Student Success
in Core English Courses

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The Setting

The setting of this study involves an rural, public open-admissions university with a diverse student enrollment. It is situated in a historically rich city with a population of approximately 25,000. Because of its emphasis on collegiate nursing and education and its association with the military services, the university has satellite campuses in several regional areas, including the main campus.

The total student enrollment for the Fall of 1999 was 9,100. Approximately 90% of the students are undergraduates, and the rest are classified as graduate students. Nearly 71% of the enrollment consists of full-time students. The majority of the students (66%) are female. The ethnic composition is as follows: 68% are Caucasian, 22% are African-American and 10% of the students are from other racial or ethnic categories. Approximately two-thirds of the enrollment consists of students from seven counties/parishes in the southern part of the United States.

The Rationale

Since the beginning of higher education in America, general education courses have existed as a feature part of degree requirements. However, in spite of the fact that core courses have appeared to function as an integral part of the higher education experience, the purpose of these classes, other than to provide students with a well-rounded education, has never been clearly delineated (Tagg, 1998). The absence of conceptual unity has resulted in scruitny and criticism by individuals within and outside of academia and has generated the notion that general education is nothing more than a segment of the curriculum rather than a fully formed intellectual core with identifiable benefits (Ramsay & Bell, 1997). Without a clearly articulated purpose, universities lack the ability to defend the credibility of core curriculum, measure the learning evidenced in these courses, or possess the knowledge to reform the courses to illustrate congruency with institutional mission statements (Clewitt, 1998). For this reason, there is no more important issue facing advocates of the general education curriculum than that of defining the concept of general education.

General education reformation is becoming more and more common across the country, and in light of the recent mandates for assessment of institutional effectiveness from a number of accrediting organizations, there is a growing concern to explore whether or not their programs are still effective in their purposes. As part of this investigation, universities are taking the following three issues and others into account as part of their goal to determine if their general education curriculums are currently in line with their mission.
  1. Student demographics/needs are changing.
  2. University goals and objectives are changing.
  3. Need to reevaluate course requirements and prerequisites.

In light of the fact that universities are again evaluating their general education curricula, this study addresses the importance of reevaluation as an attempt to see that both students and universities are fulfilling their respective goals to provide students with a quality academic experience. This process of reevaluation has several fundamental considerations, one of which is addressed in this study-- the effectiveness of various academic and demographic variables on predicting the success of students in courses in the general education curriculum.

Prediction of success is not a new topic in higher education. Scores on nationally standardized exams such as the American College Testing program (ACT), Scholastic Achievement Test (SAT), and Collegiate Assessment of Academic Proficiency (CAAP) have been used as criteria for student admission, both to an institution and to a specific academic program. Recognizing that test scores do not always provide adequate information, researchers continue to conduct studies in an attempt to identify additional variables influencing success in various degree programs. Findings from these studies continue to suggest that grade point average, standardized test scores, leadership potential, and class standing were components that predict performance. Other studies have focused on analyzing variables affecting achievement in various courses in an academic specialization.

Predicting student success is an important concept, but it is also a vague one. Are students adequately prepared for their programs of study? Does a prerequisite requirement ensure this preparation? Few faculty would argue that students who passed their course should not be prepared for subsequent courses in a specified sequence. Knowing ahead of time if a student is a possible risk for failure can give the teacher a head start on working with that student toward success in the course. Several demographic and academic factors could play an important part in this prediction.

The purpose of this study, therefore, is to determine if a specific set of factors can be used to predict whether a student will successfully complete various courses in the general education curriculum. Information gained from this study could be utilized by faculty and advisors to increase student potential for success in courses in the general education curriculum as well as address the high failure rate in these courses which would affect student retention.

Specifically, discriminant analysis was used to determine if a specific set of factors could be used to predict a student's success in completing the introductory English course in the general education curriculum at a small southern university. The sample (census) for the study included those first-time freshmen who were enrolled in English 1010 in the Fall 1995, Spring 1996, Summer 1996, Fall 1996, Spring 1997, Summer 1997 and Fall 1997 semesters. This study was conceptualized as an exploratory study that included various demographic and achievement variables as the predictor variables, which are dichotomous (success/failure).

By determining the discriminant functions that differentiate the groups, the researchers determined which students would succeed in the two courses based on the following objective:

1. To determine if a model exists that increases the researcher's ability to accurately classify subjects on the variable of whether or not they were successful, as defined by a final grade of "C" or better, from the following measures in English 1010. The predictor variable for the discriminant functions included ACT English scores, age of student, full-time or part-time status, type of high school diploma, and gender.

Data were analyzed for descriptive statistics appropriate for describing the subjects with regard to the predictor variables defined in the objectives. They were also analyzed for the development of predictor equations for student outcomes in the Core English course.

The Results

The purpose of the study was to determine if a model exists that would allow the classification of subjects in terms of their success in English 1010 on the following variables:

a.   Whether or not the student completed the prerequisite requirement (minimum score of 18 on the English ACT or grade of "C" or better in English 0920;

b.   Age of student at time course was taken;

c.   ACT composite score;

d.   ACT reading score;

e.   Part-time or full-time status at time course was taken;

f.   If a traditional graduate of an in-state school, was it public or non-public?

g.   Gender;

h.   Type of high school diploma (traditional or GED).

Exactly 1,062 students were included in the census of those who took English 1010. Approximately 60.4% of these students were female and 39.6% were male. The ages of the students ranged from 16 to 47, with a mean age of 20.21 years and standard deviation of 4.56 years. Approximately 87% of the students fell in the 16-21 range. Of the students enrolled, approximately 92% were enrolled full-time, while 8% were part-time. About 83% of the students had a public school education, and 95% of the students enrolled had met the prerequisite of a minimum score of 18 on the English ACT or a grade of "C" or better in English 0920.

Of the 1,062 students included in the census, 942 students were included in the analysis; 120 were excluded because they were missing at least one discriminating factor. Of this number, 751 (80%) were successful in the course (they received grades "A," "B," "C," or "S"), and 191 (20%) were unsuccessful (they received grades "D," "F" or "W"). Descriptive statistics are provided in Table 5 for the discriminating variables used in the analysis of the two groups (success and no success).

According to the data, significant differences were found among the means for both groups on all variables tested except enrollment status and whether the prerequisite requirement had been met, which indicated that the groups were equal. An a priori level of significance of .05 was used in determining the results. To determine whether the covariance matrices were equal, Box's M was used. Based upon these results M (1.62, p.66), the assumption of equal covariance was not violated.

Table 1

<u>Means, Standard Deviations, and F-ratios Between Groups for</u>
<u>Discriminating Variables for English 1010 (N = 942)</u>

Discriminating Variable	Group		F ratio	p
	Success (n=751) m/sd	Non-Success (n=191) m/sd		
ACT Composite	20.05 3.70	18.23 3.57	37.64	·p<.01
ACT English[1]	0.74 0.44	0.58 0.49	19.01	p<.01
Prerequisite met[2]	0.00 0.06	0.01 0.07	0.06	.81
Age of student	18.98 2.37	19.55 2.26	9.12	p<.01
Full- or part-time[3]	0.95 0.22	0.94 0.23	0.22	.64
Public/Private high school[4]	0.88 0.32	0.93 0.25	4.02	.05
Type of HS diploma[5]	1.00 0.00	1.00 0.00	[6]	p<.01
Gender[7]	0.33 0.47	0.51 0.50	21.31	p<.01

[1]$1 = ACT \geq 18$, $0 = ACT < 18$
[2]1=Met, 0=Not Met
[3]1=Full-time, 0=Part-time
[4]1=Public, 0=Private
[5]1=Traditional, 0=GED
[6]Constant
[7]1=Male, 0=Female

        Table 2 illustrates the correlations between the discriminating
variables used in the study. The strength of the correlations was
interpreted using Hinkle, Wiersma and Jurs' scale (1988, p. 118). All
of the variables showed little or no correlation either in the
positive or negative direction except ACT Composite scores and ACT
Reading scores, which showed a high positive correlation coefficient
(r =.89). Again, this is a understandable relationship since ACT
Composite scores are computed using a combination of ACT subtest
scores, which include ACT Reading.

Table 2
<u>Pooled Within-Groups Correlation Matrix for English 1010:</u>
<u>Discriminating Variables (N = 942)</u>

	Age	Gender	ACTC	ACTR	Status	Prereq met	HS Type
Age	1.00						
Gender	-.02	1.00					
ACTC	-.26	.02	1.00				
ACTR	-.24	-.01	.89	1.00			
Status	-.06	.02	.10	.07	1.00		
Prereq met	.25	.02	.01	.01	.02	1.00	
HS	.06	-.02	-.07	-.07	-.02	.02	1.00

Type

Table 3 indicates that gender and ACT Composite scores had high correlations with the discriminant function. Group means were different based on the lambda shown in Table 3. Based on these findings at the .05 significance level, the researcher would reject the null hypothesis that the predictor variables ACT Composite score and gender would not discriminate between student success in English 1010, as defined as a final grade of "C" or better, and no success (.939, $p<.05$). However, the researcher would fail to reject the null hypothesis based on the remaining predictor variables tested.

Although the Wilks lambda indicates that the function is statistically significant in its ability to predict, the actual association between the scores and groups has little if any positive correlation ($R_c = .245$). Furthermore, the Eigenvalue indicates that only 6.4% of the total variation between the groups can be explained by the canonical variables.

Table 3
Summary Data for Stepwise Discriminant Analysis (English 1010)

Variables	Discriminant Function 1				
	b	s	B_0	Group	Centroids
ACTC	.80	.79	.21	Success	.13
Gender	-.61	-.59	-1.28	Non-success	.50
B_0 (constant)			-3.84		

Eigenvalue	R_c	Wilks lambda	p
.064	.245	.939	<.01

b   = standardized discriminant function coefficient
s   = within-groups structure coefficient
B_0 = unstandardized discriminant function coefficient
R_c = canonical correlation coefficient

Table 4 shows the numbers of correct and incorrect classifications. Only the cases with complete information for all predictor variables were included in the classification results table. The substantive significance of percentage of cases classified correctly was determined using the Tau statistic, which represents a 30.44% improvement over chance alone, making the Tau statistic significant (Barrick & Warmbrod, 1988). Approximately 65% of the cases were classified correctly.

Table 4
Classification of Cases for English 1010

Actual Group	No. of Cases	Predicted Group	
		Non-Success	Success
Non-Success	192	119	73
		62.0%	38.0%
Success	751	255	496
		34.0%	66.0%
Percent of cases correctly classified:		65.22%	

Conclusions

The purpose of this study was to determine if a model existed that would allow the classification of subjects in terms of their success in four courses in the general education curriculum at Northwestern State University. Very few statistically significant relationships were found between various predictor variables and student success/failure. The study, however, did not validate the need for current prerequisites for the first college English and math courses; it did validate a current prerequisite for an introductory biology course and the belief that a prerequisite should be imposed on a basic physical science course.

Results of the study suggested that the current developmental education may not be providing the necessary preparation needed for successful completion of the beginning English courses, as evidenced by its lack of predictive ability found by the discriminant model used.

The model confirmed prior findings that ACT subscores were a valid predictor of success (Keeley, et al., 1994); also, the findings suggest that ACT composite scores are strong predictors of success as well.

Recommendations

Four recommendations were made based on the results, conclusions, ideas and suggestions arising out of this study.

Recommendation 1: English 1010. Based on the findings of the models that indicated that only ACT Composite scores and gender were significant predictors of success in the first English course, university officials should investigate the validity of using the developmental education program and/or ACT minimum scores as prerequisites in both areas as to their validity in preparing students for entry into the traditional college English curriculum.

As a part of this investigation, the administration should not only look at the content of the curriculum but also at the methodology used in teaching the material. According to Lee & Burkam (1996) and Thorndike (1992), gender anxiety toward English and even mathematics achievement comes mainly from a fear of the unknown. These researchers support a more "hands-on" approach to the teaching of math and English, including laboratory assignments, computer instruction, and problem-solving based on life's experience. Interestingly, teachers in the English course studied do incorporate alternative methods of instruction into their classes; students are taught writing by computer in English, and several other diverse teaching methods are also used. These alternative methods may account for the success rates for females in English. With further exploration, the same may eventually hold true for mathematics students.

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Another area for evaluation as to its validity as a predictor is the minimum ACT scores incorporated as prerequisites for the English course. Based upon the results of this study, the cutoff scores may need to be reevaluated to include a weighted ACT Composite score and an ACT English score rather than relying on the subscale alone. For instance, a student may score moderately low in English but very high on the other subtests (reading, for example), which gives him or her a lower Composite score. The English score alone may place the student in developmental English; however, the student may possess the ability to succeed even though the English score does not indicate such. Providing a weighted scale would take into account this instance and maybe provide the benefit of the doubt. Based on the findings of the model, such may be the case.

Instructors in these areas should continue to take a more in-depth look at their rosters at the beginning of each semester, not only at ACT scores of the students, but at their gender. These two variables may give them insight as to how to prepare for the upcoming course. Interestingly, this finding supports one of the main foundations of adult education: to take students from THEIR starting point and work forward.

Recommendation 2: Further research on predictors. Even though the discriminant model was only a moderate predictor of success in English 1010, it was able to eliminate several variables as predictors of success. However, since the model was only about 60-75% accurate in determining those predictors that could affect a student's success in college, there must be other variables that could affect success and ultimately increase the accuracy of this model.

There is another arena of variables that may play an important role in predicting success, including extracurricular involvement, amount of financial aid received, educational background of parents, family support, whether students are working while attending college, and their family responsibilities while attending college. Even though these are only a few of the several variables that have not been tested, they may give advisors and instructors better insight to attributes that students bring with them to the classroom.

Recommendation 3: Further research on models. Even though this study suggested that the model was only a moderately accurate predictor of success in English 1010, it did give insight into variables that may affect student success/failure in his or her first year of college. There is no reason that this model could not be used for predicting success in other types of classes including major-related courses in all majors. University advisors in majors with low attrition rates may use this or a revised version of the discriminant model to identify potential students needing special attention prior to not succeeding in the major course or any other course. Too many schools are using assessment instruments that prove nothing for the school. Northwestern and Southeastern Louisiana University are two schools that admitted that their instruments were not providing them with any usable information and have therefore abandoned them. An interesting finding was that even though SACS requires its accredited institutions to have an assessment plan in place, only one school interviewed as part of this study had one--Southwest Texas State University. How are these schools sure that their programs of study are actually meeting their goals and expectations?

Recommendation 4: Further research on retention. Even though this study did not validate success in the developmental education program as a predictor of success in English, further research in the area of retention could give more insight into why the success rate in these courses is low. Southeastern Louisiana University spends a great deal of its time tracking students who have successfully completed their developmental education sequence to determine if this success continues throughout their students' college career. The main goal of Southeastern's developmental programs is to boost students' confidence and self esteem in specific subject areas; the university feels this confidence will enable students to be successful in future courses. This concept is supported in the literature (Edge & Friedberg, 1984; Haywood, 1976); however, very few schools interviewed as part of this study admitted to this type of assessment.

Summary

This study determined that a model could be developed that would provide a moderately accurate classification of students in terms of their success the first college English course at Northwestern State University. Even though it found very few significant predictor variables, it did add to the existing body of knowledge in the area of student attrition, and it provided enough comprehensive data to show what various types of universities are doing as part of their assessment mandates. It is hoped that continued research in this area will add to those already significant predictors and eventually provide an empirical evaluation of a student's potential for success in all areas of education.

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