The Effects of a Freshman Seminar on At-Risk Under-, Over-, and Low Achievers

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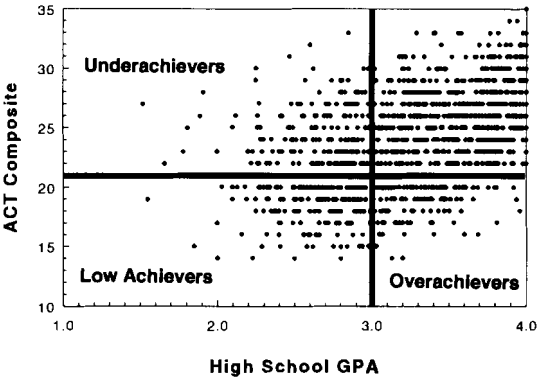
To refine their understanding of student needs, the authors categorized academically at-risk students into three groups: (a) underachievers, those with higher than average achievement test scores but lower than average high school grade point averages (GPAs); (b) overachievers, those with lower than average test scores but higher than average high school GPAs; and (c) low achievers, those with low test scores and GPAs. A freshman seminar was developed to enhance the academic success of all three groups, and academic performance was analyzed over a 3-year period. The three populations performed differently and responded to seminar content in distinct ways. Comparison with a control group showed that of all seminar students, the only gain was in the retention of low achievers. Underachievers who took the seminar did less well than those in the control group both in retention and in subsequent GPA.

Figure 1.
Distribution of Incoming Freshmen by Achievement Test Score and Grade Point Average



In 1989 the University of Idaho began a program aimed at academically at-risk freshmen in an effort to (a) improve academic advising, (b) increase retention, and (c) increase academic success.

We identified three at-risk groups using ACT or SAT scores and high school GPAs of entering freshmen in 1986. We found that the median first semester GPA at the university was 2.80 for students not at risk versus 2.35 for students who entered with higher than average high school GPAs but lower than average test scores (overachievers), 2.00 for students with higher than average test scores but lower than average high school GPAs (underachievers), and 1.60 for students below average on both measures (low achievers).

An examination of the entire range of high school GPAs and test scores for entering freshmen shows the relative position of these at-risk populations (see Figure 1). Only ACT composite scores are shown. For students who reported SAT scores only, we translated these scores to ACT composites using a locally derived algorithm based on entering students reporting both scores. At the University the correlation between ACT composite and SAT combined math and verbal scores is .87, based on a sample of 3,926 freshmen. This correlation is similar to the .89 correlation between the two sets of scores reported by Marco, Abdel-fattah, and Baron (1992) in the College Board report on score compatibility.

We did not control for socioeconomic status or financial need in our identification of at-risk students. Although socioeconomic status has been identified by Astin (1993) as a predictor of academic success or failure in the freshman year, it was not a useful measure for our institution because we have a homogeneous middle class population with fewer than 5% minorities. In addition, one of our at-risk groups, the low achievers, reports the highest parental average annual income of all freshmen at the University (measured by the Cooperative Institutional Research Program survey given to all freshmen in the fall of 1992 and 1993).

Financial need was also not a useful parameter for our identification of at-risk students. Research on our students indicates that type of financial aid package (combinations of loans, grants, and work/study) has no significant effect on student persistence or graduation rate (Davenport, 1991). Davenport also shows that students' overall financial resources without financial aid do not measurably affect graduation rate, which concurs with other findings (Astin, 1993; Murdock, 1989).

After noting that 10% of the overachiever

group came from small, rural high schools, we considered controlling for high school size in our identification of at-risk students but found no significant research on the value of high school size as a predictor of retention or academic achievement of college freshmen.

Having identified our cohorts of at-risk students based on high school GPA and national test scores, we developed a freshman transition class modeled closely after that developed by Upcraft, Gardner, and associates (1989) and recruited at-risk incoming freshmen. We hoped to see how each population might respond to freshman seminar topics such as study skills and access to campus resources and to learn about each group's learning characteristics and advising needs. We tracked academic performance of students who took the class, comparing them to similarly at-risk students who did not.

In creating the seminar, we formed three hypotheses:

1. That students who took the seminar would have higher first semester and long-term GPAs and retention rates than similar students who did not. We based this expectation on the many studies of retention that report positive results from intervening with at-risk freshmen (Jones & Watson, 1990).
2. That overachievers would respond better than students in the other two groups because high school GPA is the strongest predictor of academic success in the first year at our institution. We knew this group performed better than students in the other at-risk groups and expected the impact of the freshman seminar would also be greater for them.
3. That underachievers would respond less well than overachievers (because they were at risk on high school GPA) but would respond better than low achievers. The underachiever's test scores, we assumed, predicted greater success than the low achievers would realize. We expected that the seminar would help underachievers realize their potential.

Literature Review

We found little discussion of treating at-risk students as subgroups with varying characteristics rather than as a single cohort, which most of the literature describes. Ervin, Hogrebe, Dwinell, and Newman (1984) found that the usual predictors of high school GPA and test scores were less reliable for developmental students (high risk) than for mainstream students; in their study, correlation with high school GPA was the strongest variable, but little relationship existed between success of at-risk students and test scores. Gee (1988) found similar results and added that there were no good predictors for students over the age of 20.

Our approach to intervention with at-risk students is consistent with recommendations by Boyd, Magoon, and Leonard (1982), who conducted a campuswide survey of students and staff at the University of Maryland. These authors discovered that a variety of factors had influenced students' leaving the university before completing a degree; they argue for the necessity of identifying subgroups within college populations and creating different interventions for different kinds of students.

Using our categories of at-risk students, we found that low achievers are well documented in the retention literature. Nearly every American university calculates the degree of academic risk of new students by examining high school GPA and test scores. Most also have a retention prediction formula that includes these two variables (Astin, 1993).

Most studies of at-risk students focus on those who have been identified by high school GPA (Jones & Watson, 1990). We have been unable to find university level studies that examine overachievers or underachievers as discrete at-risk populations.

At most institutions, overachievers are unlikely to be identified as at-risk students. Their lower test scores may place them in remedial classes in math or English in their first year, but they are not typically targeted by intervention programs.

Underachievers represent a largely unexamined population in higher education. The case for addressing this group as a unique population has been made (Higbee, 1989; Lang, 1988), but little research exists on its characteristics or on effective ways to enhance its academic success beyond the high school level. We do find the underachieving high school student in the literature on gifted children (e.g., Emerick, 1992; Wolfe, 1991). One reason for high school underachievement among gifted students is likely to be boredom caused by lack of challenge.

In summary, our review shows a wealth of literature on low achievers but little on under- and overachievers.

Method

Recruitment of At-Risk Students

Beginning in the summer of 1989, we identified freshmen in the three at-risk populations and mailed them a brochure about the freshman seminar. At the same time, we asked for assistance from academic departments in recommending the new course to at-risk advisees. The University's special admission committee, which deals with applications of students who do not meet admission standards, also began to require students with low high school GPAs to take the seminar. Students placed in the seminar by committee referral constituted less than 5% of the class enrollment; most students took the class voluntarily.

Identification of Control Groups

Nonparticipating students were used as a control group for our analyses (see Table 1). Although high school GPAs and ACT scores of the seminar and control groups were quite similar, some differences existed. For example, in the fall of 1989 overachievers who took the seminar had an average ACT composite score of 16.9 compared to 19.6 for the control group. These differences were subsequently taken into account because we controlled for both GPA and ACT composite in measuring success. Also, the predominant factor predicting success is high school GPA, with the ACT score a modifying but secondary factor in predicting student success in the first two or three semesters.

Freshman Seminar Content

In the first year we had only three sections of the seminar and were able to segregate each at-risk group into its own section. The curriculum was standardized across sections, but as we taught the course, we discovered that underachievers were not responsive to the lecture format we were using. They neither answered questions in class nor did well on the objective exams (short answer and multiple choice). As we altered the format of the underachiever section to include more discussion and changed to essay exams, their participation increased as did their test scores.

Topics covered in all sections included study skills, campus resources, and transition issues such as living with roommates, money management, and homesickness. We used a commercial text supplemented with curricular materials prepared by our instructors. In the second year, we developed our own text and added units on career decision-making and values clarification. By the third year, we had moved almost entirely to a discussion and participation format, with students reporting to one another on campus resources and sharing study techniques. We did not main-

TABLE 1
High School Grade Point Average and ACT Composite for Seminar and Control Group by Risk Category, 1989 to 1991

		Underachievers	
Group	*n*	*HS GPA*	*ACT Composite*
Seminar	65	2.57	24.2
Control	283	2.68	24.2
		Overachievers	
Group	*n*	*HS GPA*	*ACT Composite*
Seminar	122	3.32	18.7
Control	645	3.33	19.5
		Low Achievers	
Group	*n*	*HS GPA*	*ACT Composite*
Seminar	203	2.58	18.2
Control	652	2.64	18.7

tain separate sections for at-risk groups in the second and third years, but we did attempt to use teaching techniques to accommodate each group's learning style.

The freshman seminar is a two-credit, letter-graded course. Credit for the class is elective and does not apply to graduation requirements.

Results

Performance of Freshman Seminar Students

After the first 3 years (1989-1991) of offering the freshman seminar in the fall semester, our results are that there is no statistically significant difference between the two groups as a whole; however when students are subdivided into risk categories the only significant difference is a slight increase in retention for low achievers who took the seminar.

Spring GPA and retention the following fall are shown in Table 2. Spring GPA was chosen as an outcome performance variable instead of the fall semester GPA because we did not want to factor out the effect of the seminar itself on the GPA. We did track the number of credits attained in the first year for both seminar and control students and found no measurable difference. (Complicating any analysis of net credits earned is the fact that, as academic advisors, we recommend that our at-risk seminar students take no more than 12 credits in their first semester.)

Taking seminar students as a single group, spring GPA was 2.10, whereas for the control group it was 2.13. Retention to the following fall semester was 68.95% and 68.16% respectively. Clearly, we found no distinguishable differences between seminar and control students.

To examine further whether the seminar students' college grades and retention were higher than would have been expected without the seminar, a covariance analysis was completed. This procedure uses the predictors of high school GPA and ACT score to estimate an expected outcome and compares students in the seminar to similar students in the control group. The process uses a series of linear models to estimate the outcome measure, testing each model against a simpler model to find the simplest one that fits the data well. Using group membership (seminar vs. control) as a predictor provides a comparison between groups. If the models without group membership fit the data as well as those with it, the implication is that the seminar produced no statistically significant difference.

Our first analyses combined all at-risk categories and compared seminar versus control students; we then separated under-, over-, and low achievers to see if our statistical interpretations might be improved.

The first model to be fit had the form $Y = I + A \times HSGPA + B \times ACT + Error$. The outcome function "Y" may be either the spring GPA or the sub-

TABLE 2
Next Semester Grade Point Average and Next Year Retention for Seminar and Control Group by Risk Category, 1989 to 1991

Underachievers			
Group	*n*	*Spring GPA*	*Fall Retention*
Seminar	65	1.86	58.4%
Control	283	1.90	62.0%
Overachievers			
Group	*n*	*Spring GPA*	*Fall Retention*
Seminar	122	2.47	78.7%
Control	645	2.44	79.1%
Low Achievers			
Group	*n*	*Spring GPA*	*Fall Retention*
Seminar	203	1.96	66.5%
Control	652	1.91	60.0%

sequent fall retention, "A" and "B" are coefficients multiplying high school GPA and ACT composite scores respectively, and "I" is the intercept.

Using all at-risk students combined, we compared these models with ones that did not use ACT as a predictor and found no statistically significant difference.

Separate estimates for the intercept "I" and grade point coefficient "A" were obtained for the two groups (seminar vs. control). Estimates were then obtained for each group, with the constraint that the slopes ("A" coefficients) were the same for each group. (This procedure is sometimes referred to as the "test for equal slopes.") Continuing this approach, we then fit the data with a model that eliminated group membership as a predictor.

The results of this process (still combining the three at-risk categories) indicated a significant relationship, as expected, between high school GPA and fall retention ($F = 29.5$; $df = 3, 1966$; $p < .01$)[1].

Looking at retention as the dependent variable, the models with separate coefficient estimates (for high school GPA) were I = 0.138 and A = 0.196 for the seminar group and I = -0.020 and A = 0.239 for the control. The test for equal slope indicated that use of the same slope ("A") for both groups was appropriate ($F = 0.51$; $df = 1, 1966$; $p = .47$), resulting in I = 0.041 for the seminar group and I = -0.006 for the control, where A = 0.230.

Thus, the difference from the seminar group's expected retention rate was not statistically significant ($F = 1.88$; $df = 1, 1966$; $p = .17$). In general, reasons for lack of statistical significance may involve (a) the size of the difference, (b) the number of persons in the group (too small a sample size), and (c) the amount of variance within the groups. In this case, the difference between the groups was fairly small (4.7%); although the sample was adequate (390 in the seminar group; 1,580 in the control), the variance within groups was quite large.

The same process was followed using spring GPA as the dependent variable. A significant relationship between high school GPA and spring (college) GPA was found ($F = 68.18$; $df = 3, 1757$; $p < .01$). The models using separate coefficients for each group resulted in I = 0.265 and A = 0.654 for the seminar group and I = -0.051 and A = 0.742 for the control. The test for equal slope again indicated the acceptable use of common slopes ($F = 0.50$; $df = 1, 1757$; $p = 0.48$), resulting in I = 0.069 for the seminar group and I = 0.004 for the control, where A = 0.723. There was no statistically significant difference in spring GPA ($F = 1.51$; $df = 1, 1757$; $p = 0.22$), mainly due to the large variation within the groups.

We have long been aware of large outcome variations within the at-risk groups. To clarify our results, we also examined the predictors and outcomes of each group by itself and tested for statistical significance. Under-, over-, and low achievers present different challenges to our faculty and have differing success in their academic pursuits. The models discussed above, then, were applied to each group separately to quantify these differences. Because of the small sample sizes and because the range of predictor variables is decreased when students are sorted into these groups, few of the statistical tests were significant. We plan to test our models as more data are collected to see whether statistical significance may be attained with larger sample sizes.

Although retention results are presented for each of the groups (see Table 3), the only statistically significant response to the freshman seminar

TABLE 3
Model of Retention for Seminar and Control Group by Risk Category, 1989 to 1991

Underachievers[1]		
Group	*Intercept*	*HS GPA Coefficient*
Seminar	0.423	0.063
Control	0.272	0.131

Overachievers[2]		
Group	*Intercept*	*HS GPA Coefficient*
Seminar	–0.127	0.275
Control	0.273	0.155

Low Achievers[3]		
Group	*Intercept*	*HS GPA Coefficient*
Seminar	0.065	0.232
Control	0.012	0.222

[1] $F = 0.59$; $df = 3, 334$; $p = .62$
[2] $F = 2.86$; $df = 3, 763$; $p = .04$
[3] $F = 4.81$; $df = 3, 851$; $p = .003$

is shown by low achievers. No pattern emerged in examining spring GPA.

These linear models are graphed in Figure 2. A comparison of over- to low achievers shows that retention improves dramatically for overachievers, further illustrating the strong effect of high school GPA. A comparison of under- to low achievers shows that higher test scores result in no improvement in retention. Further, the enhancement expected with high school GPA is also minimal for the underachievers. (Note the small value of the coefficient A for underachievers in Table 3.)

For low achievers, then, the statistical analysis shows that the seminar has a positive effect (7-8%) on first-year retention. Underachievers are a problematic group, as the seminar appears to have decreased their retention, perhaps by helping them to make more realistic decisions about college.

Summary

The university's 3-year experiment with grouping at-risk freshmen by ACT or SAT score and high school GPA and then enrolling them in a seminar produced a significant result only in the retention of low achievers.

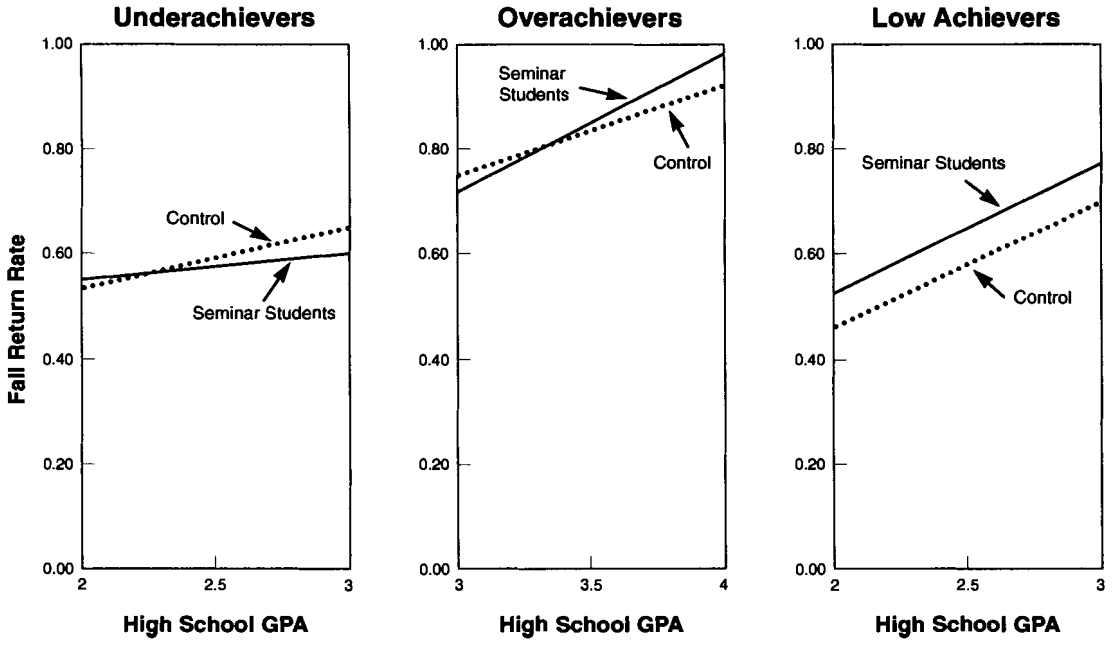
Neither the spring GPA nor the retention of overachievers who took the seminar was improved in comparison to overachievers in the control group, leading us to discontinue targeting overachievers for the freshman seminar. Instead, we have emphasized to this group's academic advisors the importance of carefully considering their test scores when advising them on first-semester course load and course selection.

The underachievers who took the seminar performed less well on both measures than did those in the control group, and neither experimental nor control underachievers did well in their first year, perhaps an extension of their unwillingness to conform to the "school game," a characteristic they exhibited in high school.

We continue to recruit new students with high school GPAs less than 3.00 into the freshman seminar; thus both under- and low achievers remain in the targeted group, although underachievers do not respond well to the recruiting efforts, comprising fewer than 10% of each section of the seminar. We continue to explore ways of enhancing our understanding of underachievers.

A second noteworthy aspect of our experiment is that at-risk groups of students are compared with at-risk control groups involving all freshmen. Most studies develop a single algorithm for the entire freshman class to describe differences in performance. This method results in the best data fit for the average student, whether or not the cor-

Figure 2.
One-Year Retention Rate by Risk Group



relations are accurate for students on the fringes such as those at risk.

We continue to explore ways to improve the format of the freshman seminar. For example, all students who register for Freshman Seminar also register for the same section of a core curriculum class such as Psychology 100; thus, they are a cohort within a large class. The seminar instructor attends all core class lectures and takes exams along with seminar students. The study skills portion of the seminar is taught in the context of core class work and the rest of the seminar curriculum focuses on campus resources and career decision-making. We have also added a variety of assessments to the curriculum (Nelson-Denny Reading Test, Myers-Briggs Type Inventory, and a survey developed by seminar instructors to measure out-of-classroom variables such as campus affiliations, living group selection, and choice of major). In addition, the university has continued to administer the Cooperative Institutional Research Program survey to incoming freshmen, and we continue to analyze data on at-risk populations, adding to our knowledge of each group's characteristics.

Note

[1] The *F*-ratio is an indication of the increase in error when one model is simplified to another. If the variable omitted is not related to the outcome measure, the value of the *F*-ratio should be close to 1.00. The degrees of freedom (*df*) are related to the models being compared and to the sample size, and *p* is a probability value. This probability value is used to judge the distance between the *F*-ratio calculated using the sample and expected value of 1.00, assuming there is no relationship between the variable dropped from the model and the outcome measure.

In the example noted, the *F*-ratio is 29.5. There were four predictors in the first, or full, model (one intercept and one slope for high school GPA for each of the two groups), and one predictor in the simpler model (the simple mean of all students). The first degree of freedom is the difference between the number of predictors (4 – 1 = 3); the second degree of freedom is the total sample size minus the number of parameters in the first model (1970 – 4 = 1966). The probability was small (< .01) that an *F*-ratio as large as 29.5 would occur when the 4-parameter model was reduced to a 1-parameter model, based on a sample size this large. In other words, the 4-parameter model fit the data much better.

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