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ABSTRACT

This study investigated the contributions of entering characteristics and college experiences on student satisfaction and degree completion using the input-environment-outcome assessment model developed by A. W. Astin (1995). A total of 594 college students who had started college about 5 years previously completed a survey about their college experiences. Data from this survey was merged with data provided by the students at the time they began college. It was found that students who spent more hours commuting tended to spend fewer hours per week studying and doing homework. Students who spent more hours per week studying and doing homework and who worked on a group project in class were more likely to be satisfied with their overall instruction in college. It was also found that students with higher high school grade point averages tended to have higher self-ratings of their overall academic ability and higher expectations of graduating with honors. Students with higher high school grades, higher self-ratings of their academic ability, and greater expectations of graduating with honors were more likely to earn a bachelor's degree and to be satisfied with their college experience. (Contains 31 references.) (MDM)

The Effects of Entering Characteristics and College Experiences on Student Satisfaction and Degree Completion: An Application of the Input-Environment-Outcome Assessment Model

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Paper presented at the Association for Institutional Research Annual Forum, Minneapolis, Minnesota, May 17-20, 1998

Abstract

The purpose of this study was to investigate the contributions of entering characteristics and college experiences on student satisfaction and degree completion using the Input-Environment-Outcome (I-E-O) assessment model. In this study, a sample of 594 students was surveyed and information regarding their college experiences was collected. A number of specific input and environmental variables were significantly correlated with student satisfaction and degree completion. Further, when the input and environmental variables were considered in a multiple regression model, it was found that several environmental variables were significantly related to student satisfaction and degree completion even after controlling for the effects of students' entering characteristics. The overall multiple regression models were significant for explaining students' satisfaction with college and their degree completion when the effects of both input and environmental variables were considered. These results indicate that environmental factors exert causal influences on students' college outcomes that are independent of their entering academic and noncognitive characteristics.

There is current interest in the identification of factors related to students' performance outcomes (such as degree completion) and their satisfaction with college (Astin, 1993). Federal regulations have been developed to require universities to publish information on graduation rates for use by prospective students and their parents (Astin, 1997). Similarly, other types of performance indicators related to student graduation have been developed (Gillmore & Hoffman, 1997). There has also been a focus on student satisfaction with their college experience. However, research is needed to assess the effects of students' entering characteristics and their university experiences on subsequent outcomes such as degree completion and satisfaction with college.

Several studies have found that both academic background and noncognitive characteristics are related to grade performance and college persistence. With regard to students' academic background, research has shown that high school achievement is a significant predictor of several types of outcomes including grades in specific courses (House & Prion, 1998), overall grade point average (House, 1996a), and persistence (House, 1994, 1995a). Similarly, admissions test scores (either ACT or SAT) have been found to be significant predictors of course performance (Edge & Friedberg, 1984; House, 1995b, 1995c; Keeley, Hurst, & House, 1994), overall grade point average (House, 1994), and persistence (House, 1996a). Considering students' noncognitive characteristics, several factors appear to be related to student achievement. For instance, academic self-concept and achievement expectancies are significantly correlated with course performance (Gordon, 1989; House, 1993a, 1995b, 1995c, 1995d, 1996b; Vollmer, 1986) and persistence (House, 1992, 1993b). Similarly, several types of student goals and parental influences are related to success in college (Eppler & Harju, 1997; House, 1997). These results indicate that an assessment of the effects of student

characteristics on academic performance should simultaneously consider both prior achievement and noncognitive factors.

Recent research has examined the effects of several aspects of the college environment, such as instructional activities and out-of-class experiences, on students' college outcomes. For instance, there are activities such as working and commuting that apparently divert student effort from academic involvement and tend to be related to lower retention (Astin, 1984). Conversely, there are specific activities that are positively related to student achievement in college. Participation in cooperative learning activities are related to improved grade performance and persistence (House & Wohlt, 1990, 1991). Further, involvement in specific social activities appears to be related to students' satisfaction with college and with their intention to persist (Milem & Berger, 1997). Finally, learning activities (giving presentations in class, taking essay exams, and working on an independent research project) that represented individual student involvement were significantly related to student persistence (Astin, 1993). These findings suggest that learning activities and social involvement have positive impacts on student satisfaction and retention while activities that draw students away from their academic efforts (such as working and commuting) have negative impacts on retention.

The input-environment-outcome (I-E-O) assessment model has been proposed as a framework for analyzing the unique effects of students' entering characteristics and college environmental factors on subsequent college outcomes (Astin, 1995). Briefly, input variables represent characteristics that the student brings to college while environmental variables represent the breadth of experiences (academic, social, and personal) that occur during college (Astin, 1995). The I-E-O assessment model enables the researcher to simultaneously evaluate the effects of input and environmental variables on

student outcomes. A limited number of previous studies have used the I-E-O model to consider input and environment variables. Kelley (1996) found that persistence was influenced by both academic and social measures while the effects of input variables (SAT scores) on persistence were minimal. Other research has found that both input and environmental variables significantly influenced the achievement outcomes of academically underprepared students (Long & Amey, 1993). These results suggest that the distinct effects of students' entering characteristics and their college experiences on subsequent outcomes should be considered simultaneously and the I-E-O model provides a method for assessing those relationships.

The purpose of this study was to apply the I-E-O assessment model to the study of two specific outcomes (student satisfaction with college and bachelor's degree completion) in order to evaluate the unique contributions of entering student characteristics and specific college experiences. This study was intended to extend previous findings by assessing the effects of both academic and noncognitive input variables and by examining the effects of two types of environmental variables (factors in the college setting and out-of-school demands on the student).

Methods

Students

Students included in this study were a sample of 594 students who had started college about five years prior to being surveyed about their college experiences (College Student Survey, 1994). Data from this survey were then merged with data provided by students at the time they began college in order to have information about students' characteristics when they began college and regarding their experiences during college. In this sample, there were 180 male students and 414 female students;

there were 524 majority students, 69 minority students, and 1 student for whom ethnic data was not available.

Measures

In order to assess the relative contributions of initial student characteristics and college experiences on subsequent outcomes, three types of variables were identified to comprise the I-E-O assessment model. Input variables included in this study were three variables previously shown to be related to student achievement: high school GPA, self-ratings of overall academic ability, and expectations of graduating with honors. The environmental variables included in this study were six measures of students' academic experiences and other factors related to achievement in college: hours per week spent on studying/homework, whether or not the student worked on a group project in class, whether or not the student changed their major, satisfaction with the overall quality of instruction, whether or not the student worked during college, and hours per week spent commuting. Finally, two outcome measures were assessed in this study: whether or not the student was satisfied with their college and whether or not they earned a bachelor's degree.

Procedures

Several methods were used to analyze the data from this study. First, correlation coefficients were computed to assess the relationships between each of the input and environment variables. Second, correlation coefficients were computed to investigate the predictive relationships between all of the input and environmental variables and both outcome measures. Finally, Causal Analytical Modeling via Blocked Regression Analysis (CAMBRA) procedures were used to evaluate the overall I-E-O model (Astin & Dey, 1997). In this approach, the initial effects of student input characteristics are controlled in order to obtain less biased estimates of the effects of the environmental variables on a

specific college outcome. This procedure minimizes the effects of the input variables so that causal inferences about the contributions of college environment variables can be made. CAMBRA represents an application of stepwise multiple linear regression where variables are separated into distinct blocks (input and environment). Each of the variables in the first block (input) is entered into the regression equation initially, followed by each of the variables from the second block (environment). None of the variables from the second block are entered into the regression equation until the variance from the variables in the first block has been accounted for. This method can be applied to outcome variables that are either continuous or categorical (Astin & Dey, 1997). This method was used for both outcome measures examined in this study (student satisfaction and degree completion).

Results

Correlations between each of the predictor variables (both input and environmental) are shown in Table 1. A number of significant correlations were obtained. High school GPA was significantly correlated with self-ratings of overall academic ability and expectations of graduating with honors; students with higher grades in high school tended to have higher self-ratings of their academic ability and higher expectations of graduating with honors. Similarly, there was a significant correlation between self-ratings of overall academic ability and expectations of graduating with honors; students with higher self-ratings of their academic ability tended to have higher expectations of graduating with honors. Students who had higher high school grades also tended to be more likely to work on a group project in class, to spend more hours per week on studying/homework, and to be more satisfied with the overall quality of instruction in college. Students who had higher expectations of graduating

with honors were also more likely to be satisfied with the quality of instruction in college and to spend more hours per week on studying/homework. Students who worked on a group project in class were also more likely to be satisfied with the quality of instruction in college. Finally, students who spent more hours per week commuting tended to spend fewer hours per week on studying/ homework.

Correlations between each predictor variable and both outcomes (satisfaction with college and earning a bachelor's degree) are summarized in Table 2. Considering student satisfaction with college, significant correlations were found for high school GPA, self-ratings of overall academic ability, and expectations of graduating with honors. Three environmental variables were also significantly positively correlated with students' satisfaction with college: hours per week spent on studying/homework, worked on a group project in class, and satisfaction with the overall quality of instruction. Finally, there was a significant negative correlation between hours per week spent commuting and student satisfaction with college; students who spent more time commuting tended to be less satisfied with their college experience. Considering whether or not students earned a bachelor's degree, significant correlations were found for high school GPA, self-ratings of overall academic ability, and expectations of graduating with honors. Students who graduated tended to have higher grades in high school, higher self-ratings of their overall academic ability, and higher expectations of graduating with honors. Several environmental factors were positively associated with degree completion: hours per week spent on studying/homework, worked on a group project in class, changed major, and satisfaction with the overall quality of instruction. However, there was a significant negative correlation between hours per week spent commuting and degree completion. Students who spent more time commuting each week were less likely to earn their bachelor's degree.

Results from the CAMBRA multiple regression analysis of students' satisfaction with college are presented in Table 3. In the first part of the analysis, the three input variables were considered. High school GPA entered the regression equation first and accounted for a significant proportion (3.21%) of the variance in student satisfaction. However, neither of the next two input variables (expectations of graduating with honors and self-ratings of overall academic ability) were significant. In the second part of the analysis, the six environmental variables were entered into the regression equation after the effects of the three input variables were already controlled for. Satisfaction with the overall quality of instruction was the first variable to enter the second block of the regression equation and explained a significant proportion (18.37%) of the remaining variance in students' satisfaction with their college, even after controlling for the effects of the input variables. Working on a group project in class was the fifth variable to enter the regression equation and also explained a significant proportion of the variance, while hours per week spent commuting entered the regression sixth and was also significant. Finally, the overall multiple regression equation including both input and environmental variables explained 24.33% of the variance in students' satisfaction with their college and was significant ($F(9,585) = 20.905$, $p = .0001$).

Findings from the CAMBRA multiple regression analysis of bachelor's degree completion are summarized in Table 4. In the first part of the analysis, the three input variables were considered. High school GPA entered the regression equation first and accounted for a significant proportion (3.47%) of the variance in degree completion. However, neither of the other two input variables (expectations of graduating with honors and self-ratings of overall academic ability) were significant. In the second part of the analysis, the six environmental variables were entered into the regression equation after the effects of the input variables were controlled for. Satisfaction with the overall

quality of instruction was the first variable to enter the second block of the regression equation and explained a significant proportion (3.59%) of the variance in degree completion, even after the effects of the input variables were accounted for. Whether or not students changed their major was the fifth variable to enter the regression equation and also explained a significant proportion of the remaining variance. Hours per week spent commuting was the sixth variable to enter the regression equation and explained a significant proportion of the remaining variance while working on a group project in class entered the regression equation seventh and was also significant. Finally, the overall multiple regression equation including both input and environmental variables explained 12.73% of the variance in students' degree completion outcomes and was significant ($F(9,585) = 9.484$, $p = .0001$).

Discussion

There were a number of significant findings from this study. First, it was found that students who spent more hours per week commuting tended to spend fewer hours per week on studying/homework. In addition, students who spent more hours per week on studying/homework and who worked on a group project in class were more likely to be satisfied with their overall quality of instruction in college. Significant correlations were also obtained for the relationship between high school GPA and students' self-beliefs; students with higher high school grades tended to have higher self-ratings of their overall academic ability and higher expectations of graduating with honors. These findings are consistent with recent research on self-efficacy theory which suggests that students with higher levels of prior achievement tend to have higher self-appraisals of their abilities (House, Keeley, & Hurst, 1995).

The results of this study also indicate that several specific input and environmental variables were significantly correlated with both outcome measures (satisfaction with college and earning a bachelor's

degree). Each of the three input variables were significantly correlated with both outcome measures, indicating that students with higher high school grades, higher self-ratings of their academic ability, and greater expectations of graduating with honors were more likely to subsequently earn a bachelor's degree and to be satisfied with their college experience. Further, students who showed a higher degree of satisfaction with their college experience had spent more hours per week on studying/ homework, worked on a group project in class, were more satisfied with the overall quality of the instruction they received, and had spent fewer hours per week commuting. Students who were more likely to earn a bachelor's degree had spent more hours per week on studying/homework, worked on a group project in class, changed their major, were more satisfied with the overall quality of the instruction they received, and had spent fewer hours per week commuting. It is possible that students who changed their major had increased their probability of graduating by findings a discipline that more closely matched their academic abilities and interests than had the major field that was originally chosen.

The results from this study indicate that, when considered simultaneously, only one of the three input variables (high school GPA) was a significant predictor of students' satisfaction with their college. Further, the results of this study also indicate that three environmental variables (satisfaction with the overall quality of instruction, working on a group project in class, and hours per week spent commuting) explained significant proportions of the variance in student satisfaction, even after the effects of the input variables were controlled for. These results suggest that both input and environmental variables exert independent causal effects on students' satisfaction with college. Considering degree completion, similar results were obtained. When considered simultaneously, one of the three input variables (high school GPA) was a significant predictor of degree completion. In addition,

these results also indicate that four environmental variables (satisfaction with the overall quality of instruction, whether or not students changed their major, hours per week spent commuting, and working on a group project in class) explained significant proportions of the variance in degree completion, even after the effects of the input variables were controlled for. The results suggest that both input and environmental variables exert independent causal effects on bachelor's degree completion. Finally, these results indicated that the set of input and environmental variables included in this study provided models of student satisfaction and degree completion that significantly explained those outcomes.

There are a number of limitations to the present study. For instance, only traditional-aged students were included in the analysis. Previous research has indicated that adult learners often have difference educational objectives, employ different learning strategies, and profit from different instructional strategies than do younger learners (House & Burns, 1986). Consequently, further study is needed to determine if these relationships would be evident for adult learners. A second limitation is that students from a single institution were included; further studies are needed to assess the general-izability of these findings. Finally, insufficient numbers of minority students were in the sample to allow meaningful analyses to be made by student ethnic group.

The results of this study indicate that both input and environmental variables exert significant influences on students' satisfaction with college and their degree completion. These results provide directions for future research on different types of academic outcomes. In addition, further study is needed on the effects of different types of input and environmental variables on students' college outcomes. However, these findings indicate that the I-E-O assessment model provides a useful framework for the evaluation of student achievement.

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Table 1

Correlations Between Predictor Variables

Variable	2	3	4	5	6	7	8	9
1. High School GPA	.475**	.380**	.156**	.081**	.143**	.120**	-.053	-.073
2. Self-Rating of Overall Academic Ability	----	.388**	.073	.028	.141**	.130**	.024	-.049
3. Expect to Graduate With Honors		----	.106**	-.001	.077	.139**	-.063	-.052
4. Hours per Week Spent on Studying/Homework			----	.206**	.111**	.178**	-.048	-.140**
5. Worked on Group Project in Class				----	.129**	.174**	-.056	-.058
6. Changed Major					----	.078	-.078	-.041
7. Satisfied With Overall Quality of Instruction						----	-.014	-.065
8. Worked During College							----	-.083*
9. Hours per Week Spent Commuting								----

Table 2

Correlations Between Predictor Variables and College Outcomes

	Satisfied With Their College	Earned a Bachelor's Degree
High School GPA	.179**	.186**
Self-Rating of Overall Academic Ability	.088*	.120**
Expect to Graduate With Honors	.119**	.141**
Hours per Week Spent on Studying/Homework	.147**	.162**
Worked on Group Project in Class	.193**	.181**
Changed Major	-.005	.165**
Satisfied With Overall Quality of Instruction	.449**	.218**
Worked During College	-.031	.008
Hours per Week Spent Commuting	-.124**	-.149**

Table 3

CAMBRA Regression Results for Students' Satisfaction With Their College

	Model R-Square	R-Square Increment	t-value at Entry	p at Entry
Input Variables				
1. High School GPA	.0321	.0321	4.43	.0001
2. Expect to Graduate With Honors	.0351	.0031	1.37	.1711
3. Self-Rating of Overall Academic Ability	.0353	.0001	0.27	.7841
Environmental Variables				
4. Satisfied With Overall Quality of Instruction	.2190	.1837	11.78	.0001
5. Worked on Group Project in Class	.2310	.0120	3.03	.0025
6. Hours per Week Spent Commuting	.2377	.0067	2.28	.0231
7. Changed Major	.2426	.0049	1.95	.0517
8. Hours per Week Spent on Studying/Homework	.2433	.0007	0.73	.4642
9. Worked During College	.2433	.0000	0.20	.8456

Table 4

CAMBRA Regression Results for Whether or Not Students Earned a Bachelor's Degree

	Model R-Square	R-Square Increment	t-value at Entry	p at Entry
Input Variables				
1. High School GPA	.0347	.0347	4.62	.0001
2. Expect to Graduate With Honors	.0405	.0058	1.89	.0589
3. Self-Rating of Overall Academic Ability	.0408	.0003	0.43	.6669
Environmental Variables				
4. Satisfied With Overall Quality of Instruction	.0767	.0359	4.78	.0001
5. Changed Major	.0929	.0162	3.24	.0012
6. Hours per Week Spent Commuting	.1072	.0143	3.07	.0022
7. Worked on Group Project in Class	.1216	.0144	3.11	.0020
8. Hours per Week Spent on Studying/Homework	.1251	.0035	1.53	.1255
9. Worked During College	.1273	.0022	1.22	.2245

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