

A Structural Model of Effects Upon
College Students' Self-Reported Gains

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Abstract

Studies of students' gains during college and effects upon those gains are becoming an increasingly important part of assessment efforts. Self-reported gains have been found to be valid and useful measures. This study provides a model of the effects of student involvement, perceived environment, and demographic and educational variables upon general education, inquiry, interaction, and career gains in a residential doctoral university where levels of student involvement are on par with national norms. The model explained 23% to 37% of the variance in self-reported gains. The study should be of interest to those with assessment and institutional research responsibilities.

A Structural Model Of Effects Upon College Students' Self-Reported Gains

Bowling Green State University has adopted as its vision statement that it “aspires to be the premier Learning Community in Ohio, and one of the best in the Nation.” Along with this vision statement, annual institutional goals have included placing students at the heart of the learning community and assessing academic and support programs. The BGSU Student Achievement Assessment Committee has identified University-wide learning outcomes that include inquiry, integration, communication, and interaction.

The Office of Institutional Research supports the assessment priority and assists in strengthening the learning community by carrying out a variety of descriptive, analytical, and predictive studies focusing on student outcomes. The BGSU Undergraduate Experiences Questionnaire (BUEQ) was developed as a tool for collecting data upon undergraduates' self-reported academic and personal gains, effort, perceptions of the university environment, and satisfaction. Under an arrangement with the College Student Experiences Questionnaire (CSEQ) program at Indiana University many items and scales from the CSEQ were incorporated into this version of the BUEQ. The BUEQ was administered to first year students in 1997 and to a sample of all main campus undergraduates in 1998. Reports of the descriptive results are available from the Office of Institutional Research (1997, 1998).

Given the availability of BUEQ data from a representative sample of undergraduates and the ability to merge it with previously collected demographic data, the opportunity existed to carry out an analytical study of the ways in which students' effort, perceptions, college, and demographic traits influence their academic and personal progress. This is particularly important given the fact that no University-wide direct measures of student gains exist at BGSU and such information is becoming increasingly important as the institution begins to prepare for

its regional re-accreditation self study.

Fortunately, a rich body of college student impact theory and literature exists to guide the current study. Following their meta-analysis of the relevant literature, Pascarella and Terenzini (1991) reaffirmed the principle that students' demographic backgrounds and the institutional environment jointly influence their quality of effort or involvement that, in turn, provides the most salient effect upon outcomes. They describe more fully in the following passage their conclusion that responsibility for student progress is a joint effort between students themselves and their institutions:

On the basis of the extensive body of evidence reviewed, . . . one of the most inescapable and unequivocal conclusions we can make is that the impact of college is largely determined by the individual's quality of effort and level of involvement in both academic and nonacademic activities. . . . Such a conclusion suggests that the impact of college is not simply the result of what a college does for or to a student. Rather, the impact is a result of the extent to which an individual student exploits the people, programs, facilities, opportunities, and experiences that the college makes available. Students are not simply the recipients of institutional effects. They themselves bear a major responsibility for the impact of their own college experience. From this perspective it is the individual student who perhaps most determines the extent to which college makes a difference.

Although this conclusion stresses the salience of individual student involvement, it in no way means that individual campus policies and programs are unimportant. Indeed, we would strongly argue the contrary. If individual effort or involvement is the critical determinant of college impact, then a key question focuses on the ways in which a

campus can shape its intellectual and interpersonal environments to invite increased student involvement. (pp. 610-611)

Davis and Murrell (1993) made use of underlying theory and data from a national sample of college students to carry out an analytical study of effects upon students' academic, personal, and vocational gains. They used results from the College Student Experiences Questionnaire (CSEQ) given to undergraduates at eleven colleges and universities nationally where levels of student effort were found to be above average. They used complex statistical analyses grounded in the college student impact theories of Pace (1979) and others and concluded that effort and students' perceptions of their institutional environment had the most pronounced effects upon gains.

The current study replicates and extends Davis and Murrell's study for undergraduates at Bowling Green State University. Its purpose is to determine to what extent and in what ways students' effort, perceptions of BGSU, college, and demographic variables affect their career, general education, inquiry, and interaction gains. It is important to note several differences between the current study and that of Davis and Murrell (1993). First, while students in Davis and Murrell's study attended institutions with above average levels of student effort as measured against CSEQ national norms, BGSU students exhibit levels of effort more on par with national averages. Second, program at Indiana University many items and scales from the CSEQ were incorporated into this version of the BUEQ, but other locally-developed items were also included; while the instruments share many common elements, they are not equivalent. Third, a different set of student background variables were used in the two studies; Davis and Murrell used age, family background, gender, college grades, and major (liberal arts or professional), while the current study used ACT scores, ethnicity, gender, and college. Finally, one seemingly

important variable, students' class level, which is included in the current study was not included in Davis and Murrell's analyses.

Methodology

Data were used in the current study from the 918 undergraduates enrolled in the spring semester of 1998 who completed all items in the BGSU Undergraduate Experiences Questionnaire (BUEQ). The demographic profile of the questionnaire respondents closely matched that of all BGSU undergraduates in terms of ethnicity, ACT scores, class level, and college. Women were somewhat over-represented among the questionnaire respondents (64% vs. 57% for the entire population). Four percent of the respondents were students of color; the ethnicity of an additional seven percent was unknown. Mean ACT composite score was 22. The distribution of respondents by class level was 26% freshmen, 23% sophomores, 16% juniors, 23% seniors, and 12% unknown. The distribution across colleges at BGSU was as follows: Arts and Sciences, 32%; Business Administration, 14%; Education and Human Development, 28%; Health and Human Services, 12%; Musical Arts, 2%; Technology, 5%; Pre-Major Advising 5%; and Non-Degree/Unknown, 2%.

The BUEQ served as the principal data source for the study; a full description of the questionnaire is available from the Office of Institutional Research (1998). The BUEQ collects data in a number of areas including satisfaction with various services and aspects of the University; academic and personal gains students feel they have made since enrolling at BGSU; involvement or effort in a number of aspects of college life; perceptions about the University and its emphasis, and the quality of relationships students have with various groups. Several items from the College Student Experiences Questionnaire (CSEQ) were adapted with permission on its copyright holder for use in the BUEQ and a fee was paid. Since the BUEQ also collects

students' identification numbers, its results can be merged with additional data maintained by the Office of Institutional Research; for the current study this included ACT scores, class level, college, ethnicity, and gender.

Factor analysis revealed that the BUEQ gains items collapse into four scales: Career Gains (three items, Cronbach's alpha reliability, α , = .83), General Education Gains (four items, α = .70), Inquiry Gains (four items, α = .84), and Interaction Gains (six items, α = .84). Satisfaction items in the questionnaire were summed into one nineteen-item scale (α = .96). Items concerning student effort factor analyzed into six scales as follows: Class (ten items, α = .81), Conversations (sixteen items, α = .91), Faculty (ten items, α = .85), Other Students (ten items, α = .90), Student Organizations (ten items, α = .89), and Writing and Learning Resources (ten items, α = .85). BUEQ items dealing with students' perceptions of the University environment factor analyzed into three scales: Institutional Cynicism (thirteen items, α = .77), Perceived Institutional Emphasis (six items, α = .88), and Perceived Relational Environment (four items, α = .77).

The research model used to investigate the relationships between student gains, effort, perceptions of the institutional environment, college, and demographic variables borrows from the comparable national study carried out by Davis and Murrell (1993), which, in turn, built upon the work of Pace (1979) and the findings summarized by Pascarella and Terenzini (1991). Separate analyses were carried out for career, general education, inquiry, and interaction gains which were treated as final dependant or "downstream" variables. Student effort served as a latent construct that influenced gains directly in each model. Students' perceptions of the relational environment (RELATE) and their perceptions of aspects of student development emphasized by BGSU (EMPHASIS) were allowed to influence gains directly and also indirectly

through their effects upon effort; the two variables were initially allowed to influence one another. The BGSU college in which students were enrolled represented the next step in the causal chain; college membership was allowed to influence gains both directly and indirectly through RELATE, EMPHASIS, and EFFORT. Finally, ACT scores, gender, ethnicity (coded as students of color or Caucasian), and class level served as independent variables in the analyses; they were allowed to influence gains directly as well as indirectly through all intermediate variables in the models.

The four final research models were developed through a combination of theoretical and empirical evidence. The initial models described above were tested using the SPSS AMOS structural equation modeling program. Non-significant probability for the overall model and goodness of fit measures such as the Bentler-Bonett normed fit index (NFI), Bollen's relative fit index (RFI), Bollen's incremental fit index (IFI), the Tucker-Lewis index (TLI), and Bentler's comparative fit index (CFI) all with values above 0.9 are indicators of robust research models. Critical ratios and modification indices were used, in keeping with theoretical evidence, to arrive at the final results shown in Figures 1-4. Initially a wider suite of variables was used in the research models, some of which were subsequently eliminated on the basis of empirical evidence. These included student satisfaction as another downstream variable, a student-institutional cynicism score and cumulative undergraduate grade point average as intermediate variables in the models, and number of weekends per month spent on campus and number of friends at the university as independent variables.

Results

Study results are shown in Tables One through Four and Figures One through Four for career, general education, inquiry, and interaction gains, respectively. Goodness of fit statistics

for the research models show that they adequately represent the underlying data. The percentage of variance accounted for in the gains scores was 37% for career gains, 33% for general education gains, 27% for inquiry gains, and 23% for interaction gains. The current study explained a higher percentage of career gains than did that of Davis and Murrell (1993), who explained 19% of what they termed vocational gains, but it did less well in explaining general education gains (Davis and Murrell explained 42%) or interaction gains (Davis and Murrell's study explained 32% of what they termed personal-social gains); Davis and Murrell did not address inquiry gains. Due to the fact that the effect sizes in the tables are standardized they are directly comparable (e.g., an effect of .400 is four times as strong as an effect of .100).

Students' self-reported career-related gains were most strongly affected by their perceptions of the emphasis the University places on student development; their class level; their perceptions of the quality of their relationships with faculty, staff, other students, and the city of Bowling Green; their quality of effort; and, to a lesser extent, being in the College of Musical Arts. These effects were positive and moderately strong. Being in the Colleges of Business Administration and Academic Enhancement had weak negative effects upon career gains. Being a student of color, being in the College of Technology, being female, and having a higher ACT score had very weak positive effects. These results are shown in Table 1 and Figure 1.

Table 1

Career Gains

Decomposition of Standardized Effects on Career Gains ($R^2=.365$) of	Direct Effect	Indirect Effect	Total Effect	Rank
Perceived Emphasis	.311	.021	.332	1
Class Level	.336	-.007	.329	2
Perceived Relational Environment	.085	.192	.277	3
Effort	.236		.236	4
College: Musical Arts	.118	.028	.146	5
College: Business Administration	-.090		-.090	6
College: Academic Enhancement	-.085		-.085	7
Ethnicity: Students of Color		.035	.035	8
College: Technology		.026	.026	9
Gender: Female		.021	.021	10
ACT		.014	.014	11

($\chi^2 = 85.328$, $df = 77$, $p = .241$, $NFI = .968$, $RFI = .944$, $IFI = .997$, $TLI = .994$, $CFI = .997$)

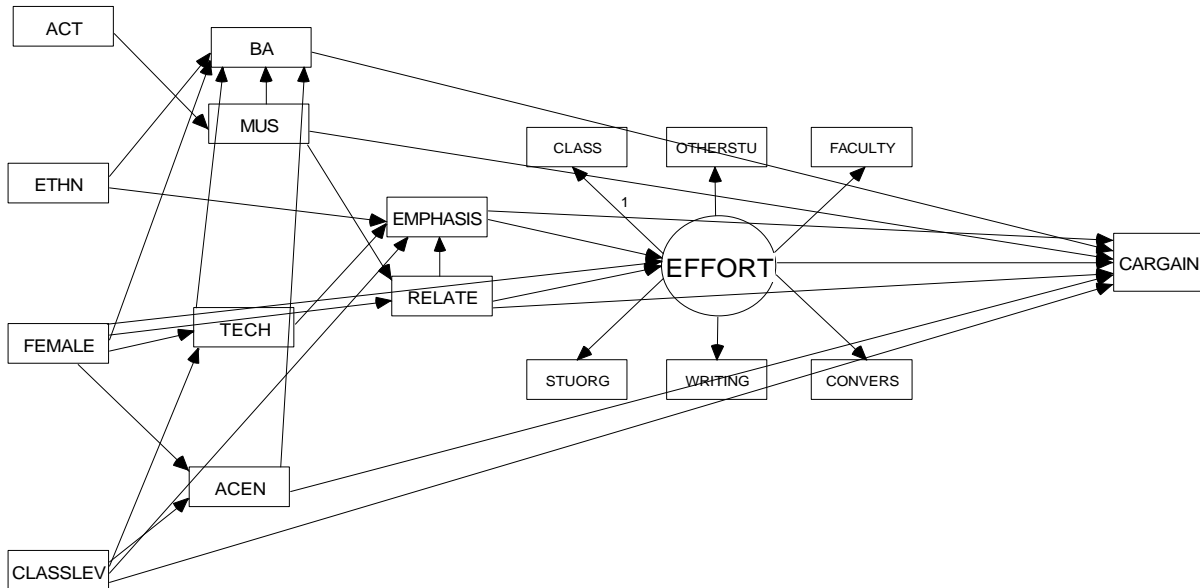


Figure 1. Career Gains

Effort, perceived emphasis upon student development, perceived quality of relationships, and being in the College of Musical Arts all had moderate positive effects upon general education gains, as arrayed in Table 2 and Figure 2. Being in the College of Arts and Sciences had a less strong positive influence. Interestingly, class level had a weak negative effect upon general education gains; seniors, for example, showed less gain than freshmen. Being in the College of Business Administration, having a higher ACT score, and being in the College of Technology had weak negative effects upon general education gains.

Table 2

General Education Gains

Decomposition of Standardized Effects on	Direct	Indirect	Total	
General Education Gains ($R^2=.331$) of	Effect	Effect	Effect	Rank
Effort	.464		.464	1
Perceived Emphasis	.210	.039	.250	2
Perceived Relational Environment		.201	.201	3
College: Musical Arts	.125	.020	.145	4
College: Arts and Sciences	.105		.105	5
Class Level		-.057	-.057	6
College: Business Administration	-.054		-.054	7
ACT		-.051	-.051	8
College: Technology	-.062	.015	-.047	9

($\chi^2 = 56.854$, $df = 54$, $p = .369$, $NFI = .976$, $RFI = .954$, $IFI = .999$, $TLI = .998$, $CFI = .999$)

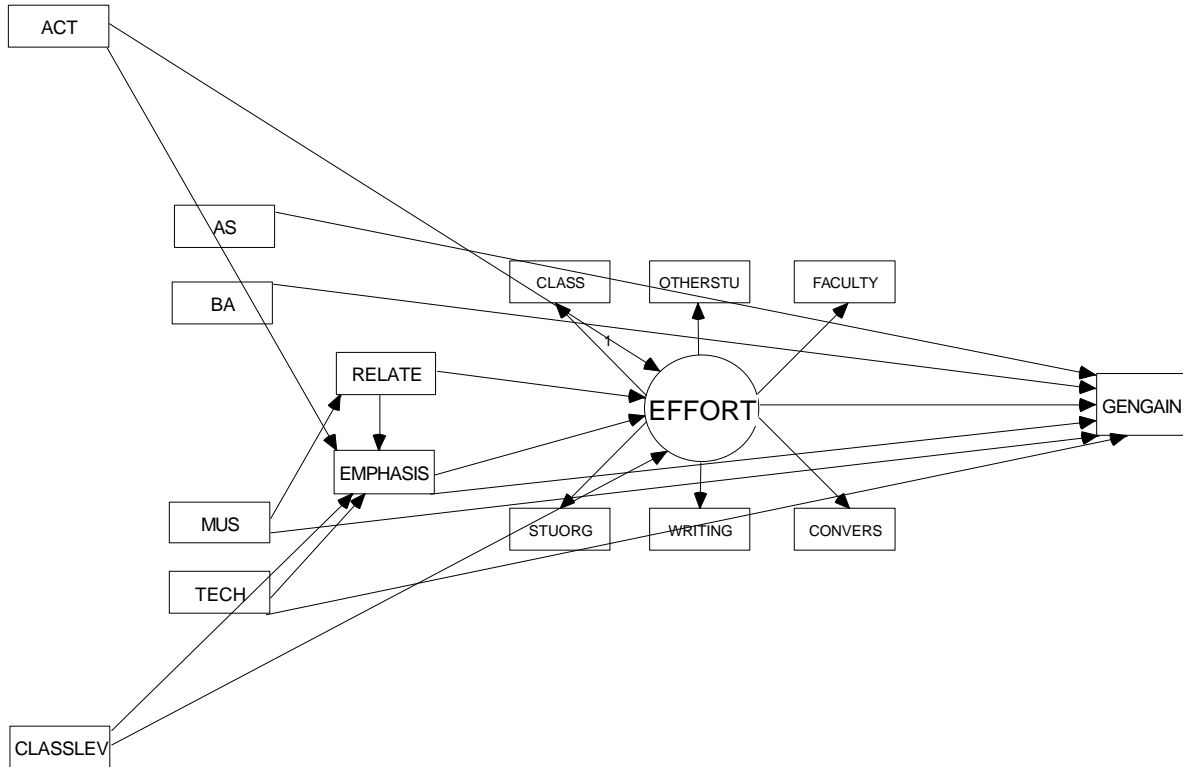


Figure 2. General Education Gains

Gains in inquiry skills, shown in Table 3 and Figure 3, exhibited moderate positive influences from perceptions of the quality of relationships, perceived emphasis upon student development, and effort. Class level had a weak positive influence, while being female and being in the College of Academic Enhancement were found to have weak negative effects upon inquiry gains. Being a student in the College of Musical Arts, being a student of color, and having a higher ACT score were associated with very weak gains in inquiry skills.

Table 3

Inquiry Gains

Decomposition of Standardized Effects on <u>Inquiry Gains (R²=.265) of</u>	Direct Effect	Indirect Effect	Total Effect	Rank
Perceived Relational Environment	.143	.180	.323	1
Perceived Emphasis	.268	.025	.293	2
Effort	.275		.275	3
Class Level	.102	-.004	.098	4
Gender: Female	-.164	.083	-.081	5
College: Academic Enhancement	-.077		-.077	6
College: Musical Arts		.034	.034	7
Ethnicity: Students of Color		.021	.021	8
ACT		.003	.003	9

($\chi^2 = 65.640$, $df = 57$, $p = .202$, $NFI = .973$, $RFI = .950$, $IFI = .996$, $TLI = .993$, $CFI = .996$)

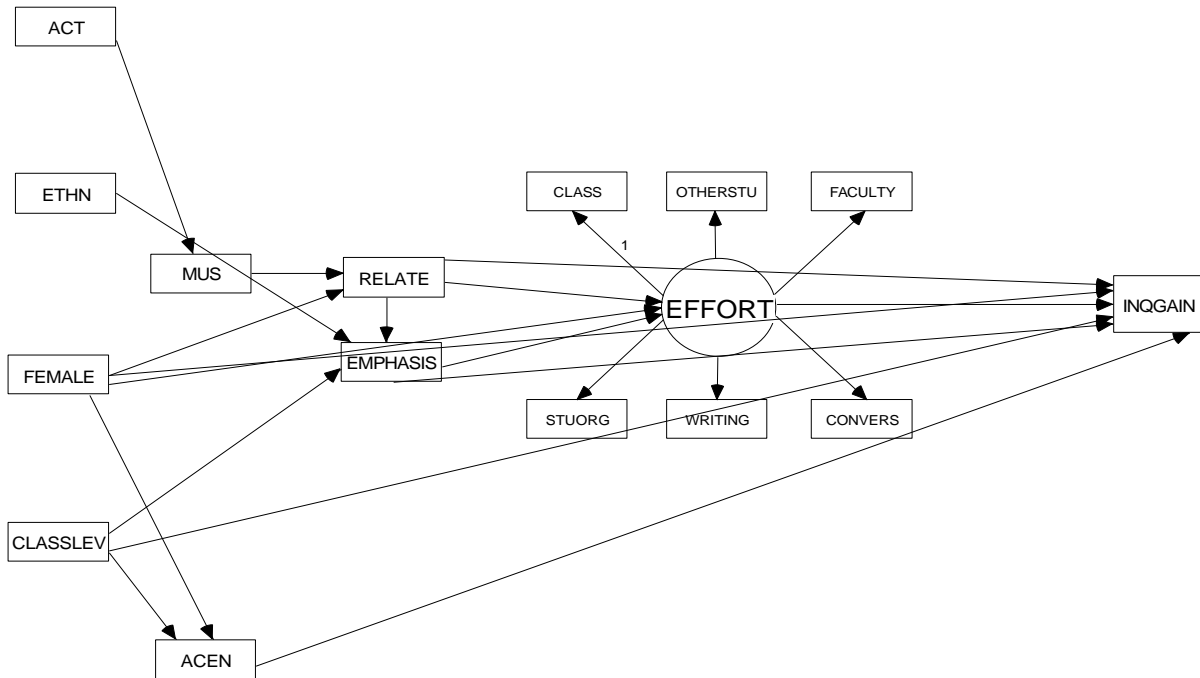


Figure 3. Inquiry Gains

As shown in Table 4 and Figure 4, perceived emphasis by the University upon student development, students' perceptions of their relationships with other groups on campus and in town, their quality of effort, and their class level had moderate positive effects upon gains on interaction skills. Having a higher ACT score had a weak negative effect. Being female and being in the College of Musical Arts had very weak positive effects. Finally, being a student of color had a very weak negative effect upon gains in interaction skills.

Table 4

Interaction Gains

Decomposition of Standardized Effects on	Direct	Indirect	Total	
Interaction Gains ($R^2=.226$) of	Effect	Effect	Effect	Rank
Perceived Emphasis	.234	.123	.357	1
Perceived Relational Environment	.192	.031	.223	2
Effort	.184		.184	3
Class Level	.146		.146	4
ACT	-.080	.002	-.078	5
Gender: Female		.044	.044	6
College: Musical Arts		.020	.020	7
Ethnicity: Students of Color		-.015	-.015	8

($\chi^2 = 71.580$, $df = 57$, $p = .093$, $NFI = .970$, $RFI = .945$, $IFI = .994$, $TLI = .988$, $CFI = .994$)

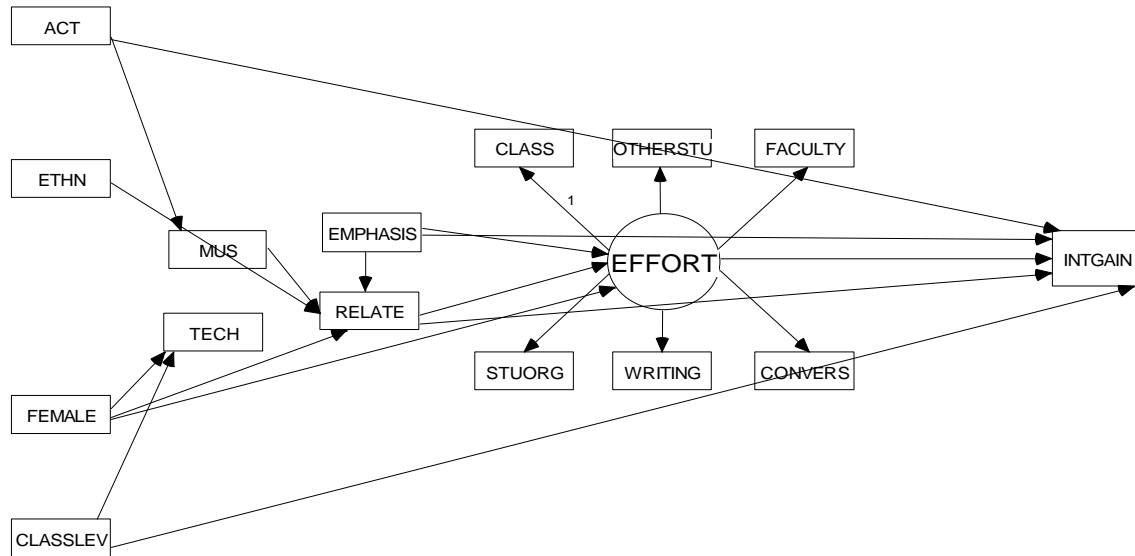


Figure 4. Interaction Gains

Summary and Conclusions

The current study was designed to answer the following question: to what extent and in what ways students' effort, perceptions of BGSU, college, and demographic variables affect career, general education, inquiry, and interaction gains? The results show that students' perceptions of the institutional emphasis upon student development; their perceptions of the quality of their relationships with faculty, staff, other students, and the city of Bowling Green; and the effort students put into six areas (classroom experiences, interaction with faculty, involvement with writing and learning resources, conversations with other students, interactions with students unlike themselves, and involvement with student organizations) have consistent moderate positive effects upon career, general education, inquiry, and interaction gains. Additionally, students show slightly greater gains as they progress through class levels (except in the case of general education gains) and if they are in the BGSU College of Musical Arts.

The results, which are generally similar to those of Davis and Murrell (1993), hold several implications for the University as it aspires to be the premier learning community in Ohio and one of the best in the Nation. First, it reaffirms the conclusion reached by Pascarella and Terenzini (1993) that students' experiences while they are in college have a much greater effect upon outcomes than do demographic characteristics. The finding from the current study that students' ACT scores, ethnicity, and gender had very weak effects upon gains suggests that BGSU is meeting its mission of fostering a diverse community of learners.

A second implication of the findings is that the factors which make the greatest difference in students' growth, their effort and perceptions, are, at least to an extent, subject to institutional control. This is particularly true for perceptions of institutional emphasis and of the quality of relationships because they, in turn, have the greatest effects upon effort.

While students' perceptions and effort can never, of course, be entirely affected by their university, it seems reasonable that responses in these two areas in future editions of the BUEQ could and should become increasingly positive as BGSU's policies and practices are increasingly guided by our vision statement. Terenzini (personal communication, 1995) has indicated that important student perceptions and effort may be affected by institutional actions like those noted by Kuh et al. (1991) in the landmark study Involving Colleges.

A third implication of the results lies in the fact that students exhibited slightly greater career, inquiry, and interaction gains as they progressed across class levels. While some might take it as a given that students make greater academic and personal progress as their longevity at the University increases, it is important to examine this assumption empirically. The fact that student gains across class levels, while positive, are weak, suggests that more can and should be done to promote student growth across the span of the undergraduate experience. The finding

that class level had a weak negative effect upon general education gains might be explained by the practice of students satisfying their general education course requirements in their early years at BGSU and spending time on their specialized courses in their major during their later years. It seems that an institution truly committed to the ideal of a learning community would find ways to mitigate this effect.

A final implication lies in the result that students in the College of Musical Arts demonstrated positive, although weak, gains in each of the areas examined in the study. Musical Arts was, in fact, the only college consistently associated with positive career, general education, inquiry, and interaction gains. Several practices in Musical Arts may account for these results, such as an unusually high degree of faculty-student and peer interaction and a strong integration between classroom and co-curricular activities. Other colleges might benefit from examining and, where practical, adopting these practices.

Several limitations must be acknowledged in considering the policy and practice implications of the study results. First, while the profile of the 1998 BUEQ respondents generally paralleled that of all BGSU undergraduates and the number of students in the data set underlying this study (918) is reasonably high, the response rate of 25% should be higher in future efforts. Second, some have questioned the validity of college students' self-reported gains. Several researchers (such as Pike, 1995) have found student reports of their experiences to be highly correlated with relevant achievement test scores and Kuh et al. (1997) note that self-reports are likely to be valid when students can easily answer the questions, the questions are unambiguous, and students think answering the questionnaire is important and take their responses seriously. Hopefully this is and continues to be the case with the BUEQ; the Office of Institutional Research actively seeks feedback about the BUEQ's utility and validity. This is particularly

important since no systematically and broadly administered direct measure of student gains exists at BGSU.

Despite these limitations the current study has made an important initial contribution toward describing the factors which affect career, general education, inquiry, and interaction gains of undergraduates at Bowling Green State University. As the institution continues to examine and change its policies and practices, the Office of Institutional Research will continue to refine its assessment research methods in support of positioning BGSU as the premier learning community in Ohio and one of the best in the Nation.

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