

## DIVERSITY, PERFORMANCE, AND SATISFACTION IN STUDENT GROUP PROJECTS: An Empirical Study

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This paper focuses on the effect that diversity has on the performance and satisfaction of student groups in a computer simulation project. Using structural equation modeling, we find evidence to support the contention of previous research that diversity negatively affects group satisfaction. This finding was strongest for undergraduate groups. While the relationship between diversity and performance is inconclusive, groups that are dominated by one person tend to have below average performance.  
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The face of the United States is changing. Although long considered a "melting pot" of cultures and races, the U.S. population has become more ethnically diverse in recent decades, leading some to predict that by 2050 the U.S. will become a "minority/majority" nation, with no one group predominant. Some of the population trends predicted over the next thirty-five years include a 68% increase in African-Americans, a 79% increase in Asian-Americans, a 187% increase in Hispanic-Americans, and only a 25% increase in Caucasian-Americans (Sausser, 1993).

Not surprisingly, the increasingly ethnic population has resulted in a more diverse workforce as well. The Hudson Institute, in a study done for the U.S. Labor Department, predicts that 85% of net new entrants into the workforce between now and the end of the century will be ethnic minorities. Almost half of this group will be new immigrants. White males will only account for 15% of the net new

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additions to the labor force over this time period. Finally, by the year 2000, the American workforce will be 47% female and 26% minority (Makower, 1994). These trends are in evidence across many different occupational groups including education, business, health care, and service industries, leading one scholar to note that "diversity is our destiny" (Moses, 1994).

This dramatic demographic change has profound implications for educators. If students are going to be productive in a society that is increasingly multicultural, their education must prepare them for this challenge. This charge is particularly salient for higher education since preparing students for the worlds in which they live and work has long been considered one of the primary charges of American colleges and universities (Moses, 1994). In order to be productive in today's world, students must be equipped with the knowledge and the skills to interact and work with people of diverse backgrounds. Higher education, by virtue of its chronological proximity to students' workforce participation, is well placed to provide these skills, leading some to conclude that success in this area should become an important indicator of education quality (Moses, 1994; Gaudiani, 1991; Smith, 1989).

Higher education has responded to the imperatives of diversity in a number of ways, including promoting ethnic diversity on campus, tailoring curricula to educate students on multicultural issues, developing a campus climate that simultaneously encourages both diversity and educational excellence, and conducting research on diversity-related issues. Within the classroom, many faculty are experimenting with teaching methods and exercises that develop students' skills in dealing with diversity. In fact, in a recent survey of business leaders, managing a diverse workforce was frequently mentioned as a major challenge facing managers over the next decade (Sirota, Alper, and Pfau, 1989).

Group projects, which have become very popular throughout higher education, can be an effective tool for improving teamwork skills and exposing students to diversity. Working in groups, often for a period of weeks or months, on case studies, term papers, simulations, presentations, or other classroom projects, gives students firsthand experience with using teamwork to solve complex problems. Along with learning about group processes, which is often a key goal of these exercises, students can improve their communication and leadership skills as well.<sup>1</sup>

Group projects also provide the instructor with a means to develop student skills in dealing with diversity. By composing teams of members with heterogeneous backgrounds, students will gain experience in effectively interacting with dissimilar others. This skill, while important in many different occupational settings, is particularly important for minorities, since research indicates that they will frequently be involved in work projects with others who do not share their background (Ibarra, 1995). Given the importance of diversity and teamwork in the career success of students in many different fields, it is important that instructors understand factors that facilitate or impede performance in student groups. That is the focus of this study.

## DIVERSITY IN THE CLASSROOM

Diversity, a term used frequently by the popular press, has a variety of meanings. In general, diversity refers to differences among people that often result in different attitudes, norms, communication patterns, and/or behaviors. In some cases, the source of diversity is race, age, gender, religious background, or ethnicity. This type of diversity, which is based on personal characteristics, has received most of the attention in the press. However, diversity can also refer to differences based on people's roles. For example, a team composed of managers, supervisors, and line employees is considered diverse, as is a team made up of members from different functional backgrounds (e.g., engineering, marketing, R&D, and quality control). This type of role-related diversity, although less visible than multicultural diversity, characterizes almost all organizations to some extent.

### Group Diversity and Performance

Previous research suggests that instructors should not expect a priori that student team diversity will lead to gains in either group performance or satisfaction, and might do the opposite. Existing research on this subject, some of which is quite dated, indicates that diversity based on personal characteristics such as race or gender damages group performance (Kanter, 1977; Kent and McGrath, 1969; Kumar, Subramanian, and Norris, 1991; Ruhe, 1978). These performance losses were primarily attributed to communication problems among dissimilar group members, and were found to be mitigated in some studies by the length of time over which groups met and by group size (Adler, 1991; Watson, Michaelsen, and Sharp, 1991; Watson, Kumar, and Michaelsen, 1993). This performance loss has led one researcher to recommend minimizing diversity in decision-making teams (Maznevski, 1994).

On the other hand, increased diversity could lead to enhanced group performance if the group's multiple viewpoints encourage better decision making, creativity, and innovation. In fact, research in strategic management suggests that, in some environments, firms managed by more functionally diverse top management teams outperform their counterparts (Murray, 1989; Priem, 1990).

Thus, diverse groups are faced with a trade-off: the performance loss due to communication problems versus the potential performance gains from having the diverse resources necessary to view the group task from multiple perspectives. Since most of the prior research has not involved student groups, it is not clear whether they will be more vulnerable or resilient to the challenges that diversity presents. However, our hypothesis reflects the bulk of the research to date, which suggests that increased group diversity will diminish performance.

*H1: Increased student group diversity will be related to poorer group performance.*

### Group Diversity and Satisfaction

In addition to group performance, many instructors seek to promote group satisfaction as well. Students that have satisfying group experiences are more likely to approach their participation in future group activities with positive expectations; also, satisfaction may be an indicator that the students have demonstrated effective group processing skills.

So what effect, if any, should instructors expect that diversity will have on group satisfaction? A number of factors affect group satisfaction including the quality of interaction among the group members, group cohesion, group dominance, and performance on the group task. The first two of these factors are directly related to group diversity. To the extent that it contributes to communication problems, diversity will have a negative impact on the quality of interaction among group members, which hurts group satisfaction. If, however, diversity among group members leads to higher performance—for example, by providing the group with varied perspectives—diversity may indirectly improve satisfaction through the group outcome factor.

Group cohesion refers to individual members' perceptions of the attractiveness of the group. Members of cohesive groups are more satisfied with their group than members from noncohesive groups. The extent to which a group is cohesive is determined, in part, by the diversity of group members. Differences in group members' backgrounds, attitudes, experience, and other personal characteristics are negatively associated with group cohesion (George and Jones, 1996).

While diversity may possibly have a positive indirect effect on group satisfaction, the bulk of the literature indicates that it should have a negative effect. However, given the paucity of empirical research, the overall net effect of diversity on satisfaction is, at this point in time, somewhat uncertain.

*H2: Increased student group diversity will negatively affect group satisfaction.*

### Group Performance and Group Satisfaction

While there is no demonstrated causal link between group satisfaction and performance, it is likely that the performance and satisfaction of groups are related. Educational studies indicate that on an individual level, satisfaction and performance *are* linked. For instance, Liu and Jung (1980) reported that satisfaction and grade-point average are correlated. Pike (1991a) found that enhanced student satisfaction typically led to better grades, but not the reverse, while Bean and Bradley (1986) found that satisfaction and performance reinforce each other.

It seems reasonable to expect that these relationships will extend to groups as well. Certainly, students seem much more satisfied with a group experience that results in a successful outcome on the group task (for example, “winning” the simulation game) than with an unfavorable group outcome. It also seems reasonable to assume that groups that are satisfied with their membership will be motivated to work harder and will have more positive interactions—both factors that could have a positive impact on group performance. A review of research in social psychology confirms these propositions by showing that group cohesiveness and performance reinforce each other (Mullen and Copper, 1994). Interestingly, the evidence cited in this paper suggests that performance has a greater effect on cohesiveness than cohesiveness has on performance.

*H3a: More satisfied student groups will achieve superior performance.*

*H3b: Superior performing student groups will be more satisfied.*

### Control Variables

While the primary focus of this paper is on the effect that diversity has on satisfaction and performance, there are several variables that may affect the dependent variables that need to be included in the analysis. The average age of group members is one of these control variables. Older students may have more experience with group activities, which may facilitate group processes. A second control variable is the combined intellectual resources of the group. The average GPA within the group serves as a proxy. One would expect that groups comprised of better students should outperform their counterpart groups and possibly be more accepting of group assignments. Third, a measure of strategic consistency has also been included in the model. Experience in administering the simulation has shown that groups that follow very consistent strategies tend to do better. We expect strategic consistency to only affect group performance.

Finally, the extent to which the group's decision-making process is dominated by one group member will affect the group's overall satisfaction and, possibly, its performance. Groups that are dominated by one member will not benefit from the shared talents and efforts of the other group members. Neglecting these untapped resources should result in diminished group performance. Similarly, situations where the opinions and ideas of most group members are ignored will lead to lower overall group satisfaction. While the research in this area is far from conclusive, some studies have shown that participative groups make more accurate decisions than individuals and are more satisfied with the group process (Cotton et al., 1988).

## RESEARCH METHODOLOGY

### Empirical Setting

Data for this project was collected from capstone undergraduate and graduate-level classes in management at a large midwestern university. Students in these classes were required to form groups and participate in *The Business Strategy Game: A Global Industry Simulation* (Thompson and Steppenbeck, 1992). In this exercise, groups manage a simulated athletic footwear company that competes against companies managed by their classmates. A recent survey found that simulation games are growing in popularity, particularly in undergraduate courses in management (Parks and Lindstrom, 1995). The learning benefits of these games include their realistic portrayal of complex decision making and their usefulness in investigating cause and effect relationships (Keys and Wolfe, 1990). The longevity of the games (many run for most of a semester) and the complexity of the simulation task (*The Business Strategy Game* requires 30 or more decisions made weekly that span different functional areas of business) provide a situation in which instructors may introduce students to management team diversity, in addition to the course material covered in the simulation. These simulations expose students to a realistic group decision-making task, although they obviously cannot provide a completely realistic organizational context. A good description of *The Business Strategy Game* can be found in Morris (1995).

One of the benefits of using *The Business Strategy Game* for research on group performance is that it provides the researcher with an objective, quantitative performance measure. The program provides an overall performance score based on six factors (sales revenue, net profit, return on equity, stock price, bond rating, and strategy rating<sup>2</sup>).

Students generally formed their own groups. The size of these groups varied between two and five students, although four students was the most common size. Groups typically made between five and eight sets of decisions; one set of decisions would be handed in each week. Each set of decisions equates to one year in this simulation game. Additionally, both undergraduate and graduate groups were required to submit a final report on their "firm" and the simulation game at the end of the term. The game and associated assignments accounted for 25–30% of a student's overall course grade, which ensured that the students took this assignment seriously.

### Questionnaire

A questionnaire was administered to each student at the conclusion of the simulation game. It asked for some demographic information that was checked against student records for accuracy. Most of the items in the questionnaire were designed to measure respondents' levels of satisfaction with their group and their perceptions of their group's diversity. Examples of two items are: "My team

members worked really well together” and “The people in my team were very different from each other.” Students responded using a five-point response range from “strongly disagree” to “strongly agree,” with the midpoint labeled “uncertain.” The questionnaire items are listed in Table 1.

### Description of Sample

We collected data from Spring Semester 1994 through Summer Semester 1995. Data are included from 129 groups (or companies) in 21 class sections (or industries). Eight industries and 51 groups were composed of graduate students with the remainder coming from undergraduate sections. Virtually all of the 411 students involved in this exercise were business majors.

### Operationalization of Variables

The data used in this study can be grouped into three categories. The first category is composed of the responses to the questionnaire that was described above. Since the analysis for this study must be done at the group level, individual responses to these questions were aggregated to the group level by taking averages. Once this was accomplished, a confirmatory factor analysis was performed to ensure that we were successful in measuring the desired constructs (group diversity and group satisfaction) in our questionnaire.

The next category is demographic information collected for individual group members. These data include age, race, gender, and academic performance. Age is measured by calendar years. Race and gender were both indicator variables (race: 0—white, 1—nonwhite; gender: 0—male, 1—female).<sup>3</sup> Academic perfor-

**TABLE 1. List of Questionnaire Items and Acronyms Used in Correlation Matrices**

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1. My team members worked very well together. (TEAMWK1)
  2. The opinions of all team members were equally considered and respected. (TEAMCOM1)
  3. I was comfortable voicing my opinion, even if it was different from other group members. (TEAMCOM2)
  4. The people in my group were very different from each other. (HETERO1)
  5. Our group had a consistent strategy throughout the game. (CONS)
  6. The members of my group had very similar backgrounds. (HETERO2)
  7. One group member made most of the decisions for our group. (GRPDOM)
  8. It is easy to talk openly to all members of my team. (TEAMCOM3)
  9. Communication in my group is very open. (TEAMCOM4)
  10. My group valued consensus in making decisions. (TEAMWK2)
  11. I found it enjoyable to work with the members of my group. (TEAMWK3)
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All of these items were rated on a 5-point scale ranging from “strongly disagree” to “strongly agree.”

mance is measured by a student's cumulative grade-point average through the semester *prior* to his or her enrollment in the strategic management course (this variable is represented in tables by GPA). Once again, these individual variables needed to be aggregated to the group level. Therefore, we calculated group means for each variable; in the cases of race and gender, the group means actually represent the percentage of group members that are nonwhite and female.<sup>4</sup>

The final category of data collected was group-level performance data. These data were supplied to us as an output of *The Business Strategy Game*. A composite performance measure was used that is based on a 100-point scale and is determined by each group's relative standing in its industry in the areas of market share, profitability, return on equity, stock value, bond rating, and strategy rating.

## STATISTICAL ANALYSIS AND RESULTS

### Methodology

LISREL, a structural equations modeling technique (Joreskog and Sorbom, 1993), was employed to explore the structural relationships between the exogenous variables (average age, average GPA, group diversity, group dominance, and strategic consistency) and the endogenous variables (group satisfaction and performance). Basically, LISREL combines path analysis (the structural model) with confirmatory factor analysis (the measurement model). It allows the researcher to assess the effect of one variable on another in a nonexperimental situation. By allowing the researcher to combine the measurement model with the structural model, the effectiveness of the latent variables as measures of the independent variables can be assessed. This allows the biases associated with measurement error or reliability to be minimized (Herting, 1985). Structural equation modeling has been used in studies of student performance (for example, see Pike, 1991b). Correlation matrices that include all of the variables in the analysis in both samples are shown in Tables 2a and 2b.

### Measurement Model

Two latent variables are included in the model. Group satisfaction is a function of seven questionnaire items. All of these items load significantly on this latent variable. Group diversity, an exogenous latent variable, is a function of two questionnaire items. Both of these items also load significantly on the latent variable. Three indices can be used to assess the overall fit of the measurement model; they are the ratio of  $\chi^2/df$ , the goodness-of-fit index (GFI), and the comparative fit index (CFI). All three indices are acceptable in both samples; the fit is especially good in the larger undergraduate sample. The results of the measurement model for both the undergraduate and graduate samples are presented in Table 3.

Note that several of the items that comprise group satisfaction directly relate to the quality of communications within the group (items 2, 3, 8, and 9 in Table 1).

TABLE 2a. Correlations and Descriptive Statistics for the Undergraduate Sample

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	
1	1.00																			
2	-0.25	1.00																		
3	-0.15	0.50	1.00																	
4	-0.13	0.26	0.08	1.00																
5	0.22	-0.13	0.15	0.15	1.00															
6	0.22	-0.14	-0.14	-0.10	-0.01	1.00														
7	0.18	-0.48	-0.23	-0.43	0.25	0.25	1.00													
8	0.15	-0.42	-0.20	-0.44	0.10	0.34	0.73	1.00												
9	0.18	-0.57	-0.31	-0.36	0.25	0.23	0.85	0.78	1.00											
10	0.18	-0.48	-0.31	-0.36	0.24	0.25	0.77	0.69	0.81	1.00										
11	0.02	-0.35	-0.31	-0.24	0.18	0.24	0.65	0.69	0.77	0.72	1.00									
12	0.04	-0.47	-0.39	-0.37	0.23	0.22	0.76	0.71	0.85	0.77	0.84	1.00								
13	0.12	-0.49	-0.32	-0.41	0.24	0.31	0.83	0.82	0.89	0.84	0.78	0.87	1.00							
14	0.10	-0.02	-0.08	-0.18	0.07	0.50	0.26	0.27	0.23	0.32	0.27	0.29	0.32	1.00						
15	0.24	0.01	0.05	0.02	0.05	0.12	0.10	0.10	0.04	-0.02	-0.04	-0.05	0.01	-0.01	1.00					
16	0.25	0.23	0.18	0.12	0.41	0.07	0.03	0.14	0.00	0.08	0.01	0.02	0.07	0.05	0.37	1.00				
17	0.20	-0.26	-0.43	0.09	0.01	0.12	-0.03	0.00	0.13	0.17	0.06	0.05	0.07	0.14	-0.01	-0.10	1.00			
18	0.14	-0.17	-0.22	-0.14	-0.03	-0.20	-0.10	-0.13	-0.09	-0.06	-0.13	-0.07	-0.06	-0.04	-0.02	-0.07	0.11	1.00		
19	-0.09	0.24	0.29	0.19	0.02	-0.04	0.05	-0.02	-0.03	-0.09	-0.02	-0.08	-0.10	-0.01	0.15	0.12	-0.17	-0.17	1.00	
Mean	2.86	3.35	3.18	3.36	25.90	3.36	3.74	3.70	3.94	3.83	4.31	4.07	3.99	59.40	0.39	3.44	0.39*	0.27*	0.47	
S.D.	0.30	0.87	0.90	0.97	4.85	1.21	1.01	0.80	0.87	0.94	0.67	0.84	0.87	27.50	0.21	3.66	0.16	0.19	0.22	

Variable list: 1. Average GPA, 2. HETERO1, 3. HETERO2, 4. Group dominance, 5. Average age, 6. Strategic consistency, 7. TEAMWK1, 8. TEAMWK2, 9. TEAMWK3, 10. TEAMCOM1, 11. TEAMCOM2, 12. TEAMCOM3, 13. TEAMCOM4, 14. Group performance, 15. GPA diversity, 16. Age diversity, 17. Race, 18. Gender, 19. Educational diversity (items 2, 3, 4, 6, 7, 8, 9, 10, 11, 12, and 13 were taken from the questionnaire).

\*Prior to the modification described in note 1, the average values for race and gender were 0.12 and 0.52 respectively, which means that 12% of undergraduate students were nonwhites and 52% were females.

TABLE 2b. Correlations and Descriptive Statistics for Graduate Sample

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1	1.00																		
2	-0.39	1.00																	
3	-0.23	0.51	1.00																
4	-0.36	0.26	-0.43	1.00															
5	0.02	0.34	0.31	0.10	1.00														
6	0.35	-0.29	-0.27	-0.08	-0.05	1.00													
7	0.33	-0.36	-0.25	-0.39	0.25	0.62	1.00												
8	0.28	-0.17	-0.15	-0.50	-0.05	0.36	0.47	1.00											
9	0.37	-0.28	-0.23	-0.43	0.04	0.46	0.72	0.69	1.00										
10	0.30	-0.27	-0.18	-0.52	0.08	0.49	0.85	0.56	0.71	1.00									
11	0.20	-0.12	-0.21	-0.29	0.05	0.41	0.63	0.31	0.58	0.61	1.00								
12	0.12	-0.05	-0.08	-0.32	0.04	0.44	0.73	0.42	0.58	0.73	0.61	1.00							
13	0.34	-0.22	-0.16	-0.49	-0.04	0.36	0.58	0.77	0.82	0.65	0.46	0.52	1.00						
14	0.25	-0.11	-0.14	0.01	-0.05	0.56	0.38	0.37	0.27	0.24	0.19	0.29	2.32	1.00					
15	-0.02	0.18	0.31	0.06	0.27	0.03	-0.01	0.09	0.05	-0.04	0.07	0.17	0.11	0.09	1.00				
16	-0.13	0.37	0.18	0.32	0.42	-0.31	-0.14	-0.29	-0.14	-0.09	-0.19	-0.09	-0.10	-0.25	0.19	1.00			
17	0.21	-0.10	-0.32	0.02	-0.30	0.12	0.03	0.32	0.26	-0.03	0.08	0.00	0.24	0.19	-0.14	-0.32	1.00		
18	-0.09	-0.12	-0.32	-0.00	-0.14	0.13	-0.01	0.06	-0.02	0.06	0.08	-0.00	0.13	-0.19	0.02	-0.09	0.15	1.00	
19	-0.12	0.36	0.43	0.01	0.35	-0.27	-0.12	-0.11	-0.23	-0.05	-0.06	0.05	-0.18	-0.18	0.21	0.13	-0.20	-0.01	1.00
Mean	3.42	3.44	3.04	2.64	32.10	3.83	4.19	4.08	4.31	4.19	4.56	4.43	4.37	53.30	0.23	3.91	0.41*	0.30*	0.38
S.D.	0.20	0.90	0.95	0.99	4.17	1.02	0.90	0.64	0.82	0.83	0.57	0.64	0.68	23.40	0.11	2.80	0.16	0.21	0.23

Variable list: 1. Average GPA, 2. HETERO1, 3. HETERO2, 4. Group dominance, 5. Average age, 6. Strategic consistency, 7. TEAMWK1, 8. TEAMWK2, 9. TEAMWK3, 10. TEAMCOM1, 11. TEAMCOM2, 12. TEAMCOM3, 13. TEAMCOM4, 14. Group performance, 15. GPA diversity, 16. Age diversity, 17. Race, 18. Gender, 19. Educational diversity (items 2, 3, 4, 6, 7, 8, 9, 10, 11, 12, and 13 were taken from the questionnaire).

\*Prior to the modification described in note 1, the average values for race and gender were 0.11 and 0.29 respectively, which means that 11% of undergraduate students were nonwhites and 29% were females.

**TABLE 3. Results of Measurement Model for Group Diversity and Group Satisfaction**

Item	Factor Loadings ( $\lambda$ 's)	
	Undergraduates	Graduates
<b>Group Diversity (GRPDIV)</b>		
The people in my team were very different from each other.	0.89	0.81
The members of my group had very similar backgrounds.*	0.56	0.63
<b>Group Satisfaction (GRPSAT)</b>		
My team members worked very well together.	0.87	0.89
The opinions of all team members were equally considered and respected.	0.83	0.65
I was comfortable voicing my opinion, even if it differed from other group members.	0.94	0.84
It is easy to talk openly to all members of my team.	0.87	0.90
Communication in my group is very open.	0.83	0.68
My group valued consensus in making decisions.	0.90	0.77
I found it enjoyable to work with members of my group.	0.96	0.77
$\chi^2/df$	1.76	2.56
GFI	0.88	0.75
CFI	0.97	0.86

These results were taken from the completely standardized solution.

\*This item was reverse coded.

While it may have been interesting to separate these items into a "group communications" factor, additional analysis showed that this was not appropriate. Given the very high loadings associated with these variables and the group satisfaction factor, one can safely conclude that superior group communications and enhanced group satisfaction are very closely related.

Since a major focus of this study is the effect of group diversity on satisfaction and performance, it is crucial that our measure of group diversity be valid. To test this, we examined the correlation between group diversity and several demographic measures of group diversity. These demographic measures of diversity are diversity in age, prior academic performance, racial composition, gender composition, and educational background. For age and academic performance, we calculated each group's standard deviation for these variables. Larger standard deviations for age and academic performance indicate greater differences within a group on these dimensions. As described in note 2, larger values for race and

gender represent less diverse groups. Finally, another category of diversity that we felt the need to examine was diversity in educational backgrounds. Since our undergraduate students were all business majors, we examined the diversity in areas of specialization (accounting vs. marketing vs. management, etc.). For our MBA students, we examined undergraduate majors.<sup>5</sup>

Group diversity is significantly correlated with almost all of the demographic variables. In the undergraduate sample, the correlations with race ( $-0.40$ ) and educational diversity ( $0.32$ ) are significant at the 0.01 level and the correlations with gender ( $-0.22$ ) and age diversity ( $0.24$ ) are significant at the 0.05 level. In the graduate sample, group and age diversity is significantly correlated with educational diversity ( $0.45$ ) and age diversity ( $0.32$ ) at the 0.05 level and gender ( $-0.25$ ) and race ( $-0.24$ ) at the 0.10 level.<sup>6</sup> Thus, we can be reasonably confident that group diversity adequately captures the desired construct.<sup>7</sup>

### Structural Model

The structural model that we are proposing is a nonrecursive model because we are specifying a bidirectional relationship between group satisfaction and performance. As stated above, the research on group satisfaction and group performance has not found consistent results between these two constructs. Therefore, we have included paths in both directions.

The overall fit of the model is quite good for both undergraduates and graduates. In both samples, the  $\chi^2/df$  ratio fell between 1 and 2, a value deemed acceptable by Carmines and McIver (1981). The GFIs for the undergraduate and graduate samples were 0.88 and 0.86 respectively. The CFIs were also extremely high in both samples (0.98 and 0.97).<sup>8</sup>

The structural relationships for both the graduate and undergraduate samples are shown in Table 4. Our structural model was very successful in explaining the determinants of group satisfaction. In the undergraduate sample, four of the five explanatory variables were found to be significantly related to satisfaction in the hypothesized direction. Hypotheses 2 and 3b were supported as diversity detracted from group satisfaction while better performance increased it. Additionally, groups comprised of slightly older students and those without a dominant member were more satisfied.

We were somewhat less successful in explaining group performance. Again focusing on the undergraduate sample, the results did not support Hypotheses 1 or 3a. While in the expected direction, the relationship between diversity and performance was not significant. Surprisingly, group satisfaction was negatively related to performance, although this coefficient was not close to reaching significance. Two of the control variables, strategic consistency (which had a dominating positive effect) and group dominance (which had a negative effect), were significantly related to performance.

We found fewer significant results in the graduate sample. This was to be ex-

TABLE 4. Results of the Structural Model

Variable	Undergraduates ( <i>n</i> = 78)		Graduates ( <i>n</i> = 51)	
	Group Sat.	Performance	Group Sat.	Performance
Group Satisfaction	—	-0.57	—	-2.29
Performance	0.43**	—	0.96***	—
Group Diversity	-0.53***	-0.15	-0.39	-0.21
Group Dominance	-0.29*	-0.42*	-0.67**	-1.24
Average Age	0.26**	0.31	0.35	0.43
Average GPA	-0.16	-0.15	-0.35	-0.42
Strategic Consistency	—	0.70***	—	2.14*
$\chi^2/df$		1.24		1.17
GFI		0.88		0.86
CFI		0.98		0.97

\**p* , 0.05, \*\**p* , 0.01, \*\*\**p* , 0.001

pected given the smaller sample size. Performance and group dominance were significantly related (in opposite directions) to group satisfaction. Strategic consistency was the only variable to be related to group performance. However, in every case, the directions of the relationships between the variables were the same as in the undergraduate sample. This provides us with much greater confidence in the results.

## DISCUSSION AND CONCLUSIONS

The empirical results support the argument that student group satisfaction is determined, in part, by the diversity of the group's membership. This finding agrees with previous research done in noneducational settings. Two somewhat related explanations have been cited for this. The first explanation points to communications problems that exist between dissimilar group members (Watson, et al., 1991, 1993). The second explanation states that diversity leads to poor group satisfaction through poor group cohesion (George and Jones, 1996).

Regardless of the reason, this finding provides both a caution and an opportunity for educators. To the extent that students have the opportunity to work in heterogeneous groups, their ability to communicate with each other and to form cohesive groups should improve with practice. However, simply assigning students to groups with the intent of increasing intergroup diversity may lead to students becoming dissatisfied with the group process. In turn, this could potentially bias students' attitudes toward group work in the future. Therefore, for these exercises to be beneficial they must be accompanied by additional instruction in group dynamics and in handling group diversity. Done properly, this attempt at skill building will benefit students (and their prospective employers) in the long run.

There is little downside risk to this recommendation, given the finding that group diversity did not appear to lead to a significant drop in group performance. However, one must remember that there was a negative association (albeit not a significant one) between group diversity and group performance. Additionally, some previous studies have found this negative relationship to hold. Therefore, instructors may want to pay heed to the findings of Adler (1991) and Watson et al., (1991), which suggest that diversity is better managed in larger groups that meet for a sustained period of time. Combined with the additional training in diversity and group dynamics mentioned above, these measures should minimize the possibility that performance will be negatively impacted by increased diversity.

One other finding worth discussing is the negative relationship between group dominance and both satisfaction and performance. This can be an acute problem in the classroom that can cause the group project experience to be dysfunctional. It behooves instructors to monitor groups and to encourage active participation by all group members. Once again, training in group dynamics, may need to be reinforced in all classes that assign group projects. This may help to reduce, but probably not eliminate, the group dominance problem.

One caveat to our findings is that our study used perceptual measures of group diversity. Even though the perceptual measures were highly correlated with objective measures of diversity, it may be possible that group satisfaction and/or performance influenced the students' perceptions of diversity. This issue is worthy of future study.

There are several other potentially fruitful areas for further research. One is a further refinement of the dimensions that comprise group diversity. For example, what do students perceive as diversity? Do students think of diversity solely in racial or gender terms, or do they recognize role and/or educational diversity as well? Furthermore, a study that checks for differential effects of these different types of diversity on satisfaction and performance would be useful.

There is also a need for a study that assesses the long-term effectiveness of projects and exercises that are intended to give students practice at encountering and working with diversity. Earlier in this section, we assumed that additional diversity and group dynamics training will help students to work more productively in diverse groups in the future. While this seems like a reasonable assumption, there is no conclusive evidence that these exercises have long-term benefits. While we recognize the inherent difficulties in setting up an empirical study like this, findings in this area would be of great interest to educators.

A useful extension to this second idea would be an experimental study in which the effectiveness of a particular intervention (goal-setting exercise, communications workshop, etc.) on group satisfaction and performance could be evaluated. Satisfaction and performance could be measured before and after the intervention. One could also test the relative effectiveness of the intervention in diverse and homogeneous groups.

## NOTES

1. The objective of this study is *not* to assess the relative merits of group activities versus individual activities. Rather, this study assesses the effects of certain group characteristics on the group's chances of success. The educational merit of individual versus group work is an important research topic in its own right.
2. The strategy rating is a composite rating of the competitiveness of each group's company, in terms of product cost, quality, etc.
3. Due to the relatively homogeneous nature of the student body at the university where this study was performed, it was necessary to combine all nonwhite respondents into one category. As Mentzer (1993) has pointed out, this practice has shortcomings. However, after combining these students, we were still left with only approximately 11% of the students being categorized as "non-white."
4. To facilitate the analysis of race and gender, we subtracted 0.5 from the group average for these variables and took the absolute value of the difference. Without this modification, the degree of diversity represented by these variables would be nonlinear, with values near zero and one representing homogeneous groups and values near 0.5 representing more diverse groups. As a result of this modification, larger values for race and gender represent less racial (gender) diversity and values closer to zero represent more diverse groups.
5. To create a numeric score for educational diversity, we used a variant of the Herfindahl Index that has been used in many studies of top management team diversity (for example, see Bantel and Jackson, 1989). The formula used is  $1 - \sum p^2$ , where  $p$  is the proportion of group members with a particular educational background. A higher value for educational diversity represents a more diverse group on this dimension.
6. These correlations are not shown in Tables 2a and 2b but are available from the first author. As an additional check of the validity of group diversity, we estimated the correlation between this factor and a "diversity index," which consisted of a linear combination of the individual demographic diversity variables. The correlations between group diversity and this index were 0.47 (undergraduate sample) and 0.53 (graduate sample), both of which are significant at the 0.0001 level.
7. An additional concern about our measure of diversity is that range restrictions in the diversity measures could attenuate the results. Since groups were self-selected, it is possible that students chose to join groups composed of individuals with similar characteristics. However, the responses on items 4 and 6 (shown in Table 1) ranged from 1 to 5 (the minimum and maximum) for both of the questionnaire items related to diversity. Also, as shown in Tables 2a and 2b, all the means for these items were slightly greater than 3 (the midpoint) with standard deviations between 0.87 and 0.95. Therefore, it appears that self-selection did not restrict the range to a point that would skew the results.
8. We modified the model in one minor way to enable it to achieve these high levels of fit. In each sample, the error terms associated with two of the variables that load on group satisfaction were allowed to be correlated.

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Received August 2, 1996.