

College Classroom Environments: Disciplinary and Institutional-Type Differences and Effects on Academic Achievement in Introductory Courses

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ABSTRACT: Using the College Classroom Environment Scales (CCES) and controlling for differences in class size, it was found that there were significant differences in students' perceptions of their classroom social climates depending on the type of collegiate institution they attended. Students at research universities perceived their classes as having more structure than did those at two year colleges and liberal arts colleges and they perceived less concern by instructors for their personal development and learning than did students at liberal arts colleges. Two-year college students perceived that their classes had higher academic standards than did their counterparts at liberal arts colleges. When comparing classes (and controlling for class size) in English composition, laboratory sciences, and behavioral sciences, it was found that students in English classes perceived them as being the most intellectually exciting and interesting, as being the most academically rigorous, as having the least amount of formal structure, and as promoting more friendships and cooperation among students (than in behavioral sciences classes). Laboratory sciences classes were perceived as having the most hostile and intimidating environments. Significant interactions of institutional type and academic discipline occurred on all scales of the CCES. It was found that perceptions of the classroom environment differentially affected students' course grades in each of the academic discipline areas.

Based on a life expectancy of nearly 75 years of age (Census, 1989), college-educated individuals will spend about a quarter of their lives as students in formal learning environments. Moos (1979) asserts that the classroom is one of the most important loci for personal and academic development, and that classrooms have distinct atmospheres

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or climates that have a significant influence on that development. Because of the potential for such substantial influences on students' development, it is important for educators to understand the kinds of social environments that exist in collegiate classrooms and to begin investigating how different environments affect the student-participants and their learning. Do environments with certain characteristics encourage or promote learning better than others?

This study was undertaken to investigate (1) the characteristics of classroom climates in three types of post-secondary institutions (two-year colleges, private liberal arts colleges, and large research universities); (2) whether there are distinctive environments associated with different disciplinary areas (behavioral sciences, laboratory sciences, and English composition); and (3) what effects classroom environments have on students' learning.

Social Climate Perspective

One way to look at classrooms is from the perspective of the social climates that are created within them. Moos (1976) theorizes that environments have unique "personalities" analogous to those of people. He asserts that an environment's personality influences the behavior of its inhabitants (eliciting certain kinds of responses and suppressing others). Consequently, the social climate has a great impact on those functioning within it. For example, in high school classrooms, the social climate has been linked to students' satisfaction and mood. Moos (1976) found students to be more satisfied in classrooms that emphasized high student involvement, personal student-teacher relationships, innovative teaching methods, and clear rules regulating behavior. On the other hand, students were found to feel angry or hostile in classrooms that were low in teacher support, order, and organization. Classroom settings can also affect students' sense of well-being (Moos, 1979).

Kaye, Trickett, and Quinlan (1976) identified four types of high school classes based on combinations of degree of control and degree of support perceived by students. Teachers who ranked high on support were found to accept and use student ideas, and frequently praise or encourage class members. Students initiated conversations less in classes identified as being high in teacher control. Instructors in these classes were perceived as offering less praise and encouragement to students. Fisher and Fraser (1983) support the Kaye

et al. (1976) findings in that they found that students in high school science classes preferred teachers to show high support and low control. Similarly, Dorhout (1983), studying gifted students in grades 5 through 12, found that they preferred personal-social (friendliness, ability to create pleasant atmosphere), rather than cognitive-intellectual (expertise in subject, ability to think logically) attributes in their teachers.

Supporting many of Moos' (1979) findings, Walberg (1979) reported that students in competitive classroom environments were found to experience more failure, perform more poorly, and be less self-assured than students in cooperative or individualized classroom settings. He also found that the interrelationship of various social environment dimensions affect learning impact. For instance, in a class oriented toward class members' interaction or teacher support, a moderate degree of structure was related positively to student involvement and interaction. In settings where relationship dimensions were not emphasized, though with the same level of control, the environment was perceived by students as rigid and nonsupportive. The negative effects of competition, therefore, can be tempered by affiliation and support in the classroom.

Unfortunately, most of the work done on classroom environments has focused on secondary school settings to the exclusion of higher education. In one post-secondary study, however, DeYoung (1977) found that there were fewer absences in classes where the classroom climate more closely approximated the students' preferred learning environment. Fraser and Fisher (1982) concluded that the nature of the classroom environment contributes substantially to predicting course achievement.

Hadley and Graham (1987) found that students' perception of the classroom environment was linked to their level of intellectual development. Students at more advanced levels of intellectual development perceived the classroom environment as higher on both the Relationship and Personal Growth or Goal Orientation Dimensions than did students at less advanced levels of development. Students functioning in Perry's (1970) position of Dualism perceived greater emphasis on order and organization in the classroom.

Fraser and Treagust (1987) and Fraser and Fisher (1982) concluded that instructors and students preferred a more positive environment than either perceived as actually existing in their classes and that instructors perceived their classes more favorably than did their students.

Perceptions of Classroom Environments as Functions of Institutional Type and Academic Discipline

An important question that needs attention is whether the characteristics of macro environments associated with different types of institutions or academic disciplines are directly translated to micro environments, such as individual class sections.

Institutional Type

The researchers were unable to locate any studies that have compared classroom environments at different types of higher education institutions. Some work has been done, however, comparing different types of high schools. Moos (1979) conducted research at five types of high schools: urban, suburban, rural, vocational, and alternative. He found students' perceptions of the classroom environment were influenced by the type of school they attended. For instance, in the alternative schools (open classrooms), students perceived that interpersonal relationships were emphasized by teachers; they also perceived involvement, affiliation, and teacher support to be high. On the other hand, vocational school students perceived their classroom environments as being low in teacher support and innovation, but high in competition. Students in suburban schools perceived high teacher support but low competition in the classroom. All five school-types created different psychosocial environments, but the most pronounced differences were found between alternative schools and vocational schools.

Academic Discipline

Astin (1965) reported that collegiate classroom environments reflect systematic differences among various fields of study. For example, instructors in accounting ranked above instructors in other fields in frequency of taking attendance, in having their classes meet at regularly scheduled times, and in adhering to the textbook for their lectures. Political science instructors, on the other hand, ranked above all others in using sarcasm. Social science courses were characterized by little classroom discussion, little homework, and arguments with the instructor. English and fine arts classes were perceived as being high on class discussion, humor, and diverse opinions. Business courses were viewed as having a testing focus, a minimal research emphasis, and dull instructors.

On the secondary school level, Walberg, Steele, and House (1974) examined classroom environments in four content areas — language arts, social studies, mathematics, and science. They found that in language arts classes evaluation, synthesis, translation, student independence, and participation in discussion were emphasized. In contrast, mathematics classes emphasized analytical and memory skills, grades were stressed, and discussion was found to occur less frequently than in language arts classes. When social studies and science classes were compared, students perceived science classes as emphasizing independent exploration, memorization, interpretation, and synthesis. Associated with social studies were evaluation and an absence of humor.

Walberg and Anderson (1968) compared high school students' perceptions of mathematics and science classes and found that students perceived science classes as being diverse, disorganized, and formal. Students in mathematics classes perceived their classroom environments as being high in goal orientation, difficulty, and democracy. Students, however, appeared equally satisfied with both classes.

Research Questions

This study was undertaken to address the following questions.

1. What are the differences in students' perceptions of classroom environments at public, two-year colleges; private, liberal-arts colleges; and public, research universities when class size is controlled?
2. What are the differences in students' perceptions of classroom environments in introductory courses in English composition, behavioral sciences, and laboratory sciences when class size is controlled?
3. Are there significant interactions of institutional type and academic discipline area in regard to students' perceptions of the classroom environment when class size is controlled?
4. What influences do students' perceptions of the classroom environment have on final course grade in introductory courses in English composition, the behavioral sciences, and the laboratory sciences?

Method

Sample

Data were collected from a total of 35 introductory (first or second course) class sections in English composition, laboratory sciences (biology, chemistry, physics, and astronomy), and behavioral sciences (psychology, sociology, and social work) courses at three types of institutions: public, two-year colleges; private, liberal-arts colleges; and a public, research university. Data were collected from 2 two-year colleges in the Southeastern U.S., 2 private, liberal-arts colleges (1 in the Southeastern U.S. and 1 in the Midwestern U.S.), and a large, public, research university in the Southeastern U.S. Volunteer faculty members at each institution agreed to collect data for the project or allow a researcher to collect data during a regularly scheduled class period. Data were collected during a two-week period following the mid-point of the term (weeks 7-9 at institutions on semester calendars and weeks 6-8 at institutions on quarter calendars). Students' participation was voluntary. Participants gave permission for the release to the researchers of their SAT scores and final grade in the course.

Descriptive information about the students who participated in the study is reported in Table 1.

Mean SAT for the research university was 1013.74 (sd = 136.74), and mean class size was 52.65 (sd = 29.48). Mean SAT for the two-year colleges was 805.13 (sd = 169.86), and mean class size was 37.36 (sd = 14.27). Mean SAT for the liberal arts colleges was 975.23 (sd = 164.48), and mean class size as 25.58 (sd = 9.21). By disciplinary area, the mean SAT for laboratory sciences (LS) was 975.22 (sd = 161.70), for behavioral sciences (BS) was 894.67 (sd = 182.26), for English composition (EC) was 949.20 (sd = 186.46). Mean class size by disciplinary area was: LS = 45.67 (sd = 23.42), BS = 46.11 (sd = 18.06), and EC = 19.44 (sd = 2.91).

Instrumentation

Students completed the College Classroom Environment Scales (CCES) (Winston, Vahala, Nichols, & Gillis, 1989), which is a 62-item self-report questionnaire composed of six scales. Using a 5-place, Likert-type response scale (1 = never (almost never) true to 5 = always (almost always) true), students reported their perceptions of the classroom social environment in the specified class.

Table 1
Descriptive Characteristics of Sample

<i>Variable</i>	<i>n</i>	<i>Percent of sample</i>
<i>Sex</i>		
Male	262	37
Female	444	63
<i>Ethnicity</i>		
African American	73	10
Hispanic	10	1
Caucasian/European	608	85
Asian	8	1
Native American	2	1
Other and decline to respond	11	2
<i>Class Standing</i>		
Freshman	393	55
Sophomore	206	29
Junior	71	10
Senior	41	6
<i>Age</i>		
17	10	1
18	231	33
19	215	30
20	115	16
21	44	6
22	26	4
23	13	2
24-49	51	7

Note. Percentages may not total 100 due to rounding.

Scale descriptions. The CCES is composed of six scales (Winston, Vahala, Gillis, Nichols, Wintrow, & Rome, 1994).

High scores on the *Cathectic Learning Climate* (CLC) scale (19 items) indicate a charged academic atmosphere that stimulates students to be active participants in the class and to seek classmates' opinions and reactions. High energy is evident, which is expressed in enthusiasm for learning and exploration of ideas. *Sample items: The class seems to go very fast. Students get excited about some of the things they learn in this class.*

High scores on the *Professorial Concern* (PC) scale (12 items) indicate that students' perceive the instructor as being personally concerned about them as individuals and that they see the professor as being friendly, caring, and open, showing empathy in his or her interactions, and respecting students' ideas. *Sample items: The professor is willing to assist students outside of class. The professor shows a genuine interest in students' performance in this class.*

High scores on the *Inimical Ambiance* (IA) scale (9 items) characterize an environment that students see as being hostile, highly competitive, rigidly structured, and one in which they are uncomfortable asking questions or giving opinions. Authority is perceived as arbitrary and as exercised in a dehumanizing and aggressive manner. *Sample items: Students feel uncomfortable talking with the professor in this class. The professor is impatient when someone says something "stupid" or asks "dumb questions."*

On the *Academic Rigor* (AR) scale (8 items), high scores are indicative of an environment that is perceived as intellectually challenging and demanding. Students perceive excellence and personal responsibility as the norm, which is expressed through high, but realistic, evaluation standards. *Sample items: The professor has set high standards that students must meet in order to get good grades. To do well in this class a student must be able to think critically.*

High scores on the *Affiliation* (AF) scale (6 items) indicate that students perceive numerous informal interactions with each other and that there is a supportive and friendly peer atmosphere. Cooperation and development of mature interpersonal relationships are perceived by students as being valued. *Sample items: Students in this class have gotten to know each other well. Students often help each other with assignments or in understanding difficult material.*

High scores on the *Structure* (ST) scale (8 items) describe environments where students perceive that evaluation criteria and study plans (syllabuses) are clearly articulated and followed. There is little ambiguity about assignments or expectations, and the instructor is viewed as an authority in the course content. *Sample items: The professor follows the syllabus very closely. The guidelines for evaluation in this class have been clearly outlined.*

Reliability and validity estimates. Winston et al. (1994) reported studies that estimated the CCES' reliability and validity. Mean coefficients alpha on three separate samples were: CLC = .91, PC = .89,

IA = .74, AR = .73, AF = .73, ST = .77. Two-week test-retest reliabilities ranged from .81 to .38 (mean = .63). Validity was estimated by correlation with the College and University Classroom Environment Inventory (Fraser, Treagust, & Dennis, 1986) and by correlation of CCE scales with students' reported evaluations of the value of the course and effectiveness of the instructor. Scales most closely associated with perceived overall value of the course were: CLC ($r = .61$), PC ($r = .51$), and IA ($r = -.45$). Effectiveness of the instructor was associated with CLC ($r = .61$), PC ($r = .63$), IA ($r = -.51$), AR ($r = .33$), AF ($r = .29$), and ST ($r = .48$).

Results

Institutional Type, Disciplinary Areas, and Interactions

To answer the first three research questions — (a) are there differences in how students perceive their classroom environment at different types of institutions? (b) Are there differences in students' perceptions of classroom environments in different disciplinary areas? and (c) Are there significant interactions of institutional type and academic discipline — 6 two-way analyses of covariance (ANCOVA) were computed, with institutional type and disciplinary area as the independent variables and class size as the covariant. The covariant analysis was used because it seemed reasonable to think that class size might be an important factor in shaping the kinds of interactions and instructional techniques that were possible. Also, as noted earlier, there were substantial differences in class size across institutional type and disciplinary area.

Institutional type. As can be seen in Tables 2 and 3, statistically significant differences among institutional types were found on the PC, AR, and ST scales when controlled for the effects of class size. (Only research participants ($n = 637$) for which complete sets of data were available were used in these analyses.) Dunn's multiple comparison procedure ($p < .05$) was used to identify which means were statistically significantly different. Post hoc comparisons revealed that on the PC scale the mean for the university was statistically significantly lower than the mean for the private, liberal arts colleges. On the AR scale, the two-year-colleges mean was statistically significantly higher than the liberal-arts-colleges mean. On the ST scale the university-mean was statistically significantly greater than the

Table 2
Summary of Two-Way Analyses of Covariance
(Class Size) for Institutional Type and Disciplinary Area

<i>Source</i>	<i>df</i>	<i>Mean Square</i>	<i>F-Ratio</i>	<i>p</i>
<i>Cathectic Learning Climate</i>				
Covariant (size)	1	48.25	0.38	.55
Institutional type (I)	2	230.33	1.82	.16
Disciplinary area (D)	2	8954.90	70.68	.01
Interaction (I × D)	4	1401.15	11.08	.01
Error	628	126.70		
<i>Professorial Concern</i>				
Covariant (size)	1	68.97	1.03	.31
Institutional type (I)	2	209.04	3.12	.05
Disciplinary area (D)	2	1949.15	29.06	.01
Interaction (I × D)	4	285.34	4.25	.01
Error	628	67.07		
<i>Inimical Ambiance</i>				
Covariant (size)	1	8.52	0.36	.55
Institutional type (I)	2	17.65	0.75	.47
Disciplinary area (D)	2	287.90	12.22	.01
Interaction (I × D)	4	186.84	7.93	.01
Error	628	23.57		
<i>Academic Rigor</i>				
Covariant (size)	1	40.97	1.53	.22
Institutional type (I)	2	102.09	3.84	.02
Disciplinary area (D)	2	749.66	28.18	.01
Interaction (I × D)	4	123.66	4.65	.01
Error	628	26.59		
<i>Affiliation</i>				
Covariant (size)	1	103.69	7.19	.01
Institutional type (I)	2	12.21	0.85	.43
Disciplinary area (D)	2	82.49	5.72	.01
Interaction (I × D)	4	39.10	2.71	.03
Error	628	14.41		
<i>Structure</i>				
Covariant (size)	1	154.25	6.70	.01
Institutional type (I)	2	112.97	4.91	.01
Disciplinary area (D)	2	204.05	8.86	.01
Interaction (I × D)	4	496.11	21.55	.01
Error	628	23.02		

Table 3
College Classroom Environment Scales Means, Adjusted Means (for Class, Size), and Standard Deviations: Institutional Type and Disciplinary Area

Variable	College classroom environment scales means							
	n	CLC	PC	IA	AR	AF	ST	
<i>Institutional Type</i>								
Two-year colleges	257	60.32 (60.31) [13.66]	44.83 (45.10) [9.13]	18.09 (18.06) [5.58]	28.15 (28.27) [5.50]	20.18 (20.15) [4.11]	30.23 (30.14) [5.64]	
Liberal Arts Colleges	225	51.84 (58.12) [15.19]	45.63 (46.65) [8.62]	19.06 (18.70) [4.88]	26.70 (26.88) [5.87]	21.01 (20.65) [3.70]	30.52 (29.76) [4.78]	
Research University	271	55.52 (60.94) [16.73]	41.86 (43.59) [9.36]	18.72 (18.07) [5.03]	26.06 (27.37) [6.15]	19.18 (20.42) [4.36]	30.56 (31.78) [5.04]	
<i>Disciplinary Area</i>								
Laboratory sciences	253	48.42 (49.33) [12.83]	41.01 (40.25) [9.61]	19.99 (20.11) [5.49]	26.87 (26.61) [6.00]	20.10 (20.26) [4.00]	30.04 (30.84) [5.72]	
Behavioral Sciences	300	57.11 (62.34) [15.65]	43.23 (45.58) [8.76]	18.38 (17.62) [4.89]	24.55 (25.45) [5.31]	18.90 (19.67) [4.13]	30.99 (31.70) [4.82]	
English Composition	203	67.16 (67.69) [11.41]	48.79 (49.51) [7.40]	17.29 (17.10) [4.85]	30.57 (30.46) [4.85]	21.68 (21.29) [3.82]	30.07 (29.14) [4.87]	

Note. Means adjusted for the covariant (class size) are enclosed in parentheses. Standard deviations are enclosed in brackets. CLC = Cathartic learning climate, PC = Professorial concern, IA = Inimical ambience, AR = Academic rigor, AF = Affiliation, ST = Structure.

means for both the two-year colleges and the liberal arts colleges. There were no other statistically significant differences among means on institutional type.

Disciplinary area. Significant F ratios on the two-way analysis of covariance were found on all 6 CCE scales (see Tables 2 and 3). The Dunn's multiple comparison procedure ($p < .05$) revealed that the following disciplinary areas were statistically, significantly different from each other:

- *Cathectic Learning Climate:* All three disciplinary areas were different from each other, with EC having the larger mean followed by BS and LS.
- *Professorial Concern:* All three disciplinary areas were statistically, significantly different from each other; EC had the largest mean followed by BS and LS respectively.
- *Inimical Ambiance:* The LS mean was significantly larger than the means for both BS and EC. EC and BS, however, did not differ from each other statistically.
- *Academic Rigor:* All three disciplines were different from each other, with EC having the larger mean followed by LS and BS respectively.
- *Affiliation:* Only the mean for BS differed statistically from the mean for EC, with EC having the larger mean.
- *Structure:* The means for both LS and BS differed statistically from the mean for EC, with EC having the smaller mean. The means for BS and LS were not statistically significantly different.

Interactions of institutional type and disciplinary area. As may be seen in Table 2, there were statistically significant ($p < .03$) interactions of institutional type and disciplinary area on all six CCE scales. (These interactions are depicted in Figure 1.)

On the CLC Scale each of the disciplinary areas appeared to be perceived somewhat differently in comparison to the other areas within each type of institution. At the university, English composition classes were seen as much more interesting and intellectually stimulating than either those in the behavioral sciences or laboratory sciences. At the two-year colleges, EC and BS were similarly positively perceived, but the LS was perceived as much less stimulating and exciting intellectually in comparison. The liberal arts colleges had a pattern similar to that found for the two-year colleges, but BS and EC were perceived even more alike on the Cathectic Learning Climate Scale.

Figure 1
Interaction of Institutional Type and Disciplinary Area on CCES

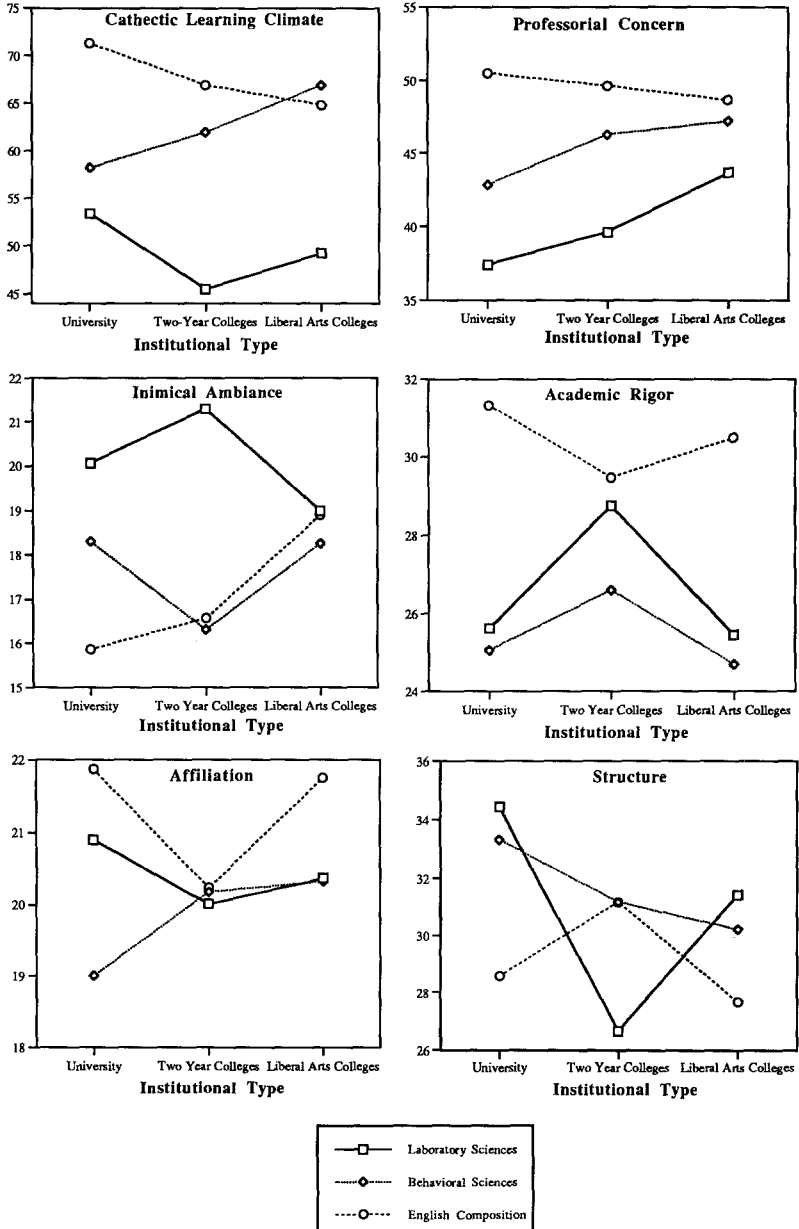


Table 4
College Classroom Environment Scale Means, Means Adjusted for Class Size, and Standard Deviations: Institutional Type by Disciplinary Area

Disciplinary Area	College Classroom Environment Scales Means						
	<i>n</i>	<i>CLC</i>	<i>PC</i>	<i>IA</i>	<i>AR</i>	<i>AF</i>	<i>ST</i>
<i>Research University</i>							
Laboratory Sciences	60	52.13 (53.29) [10.26]	38.12 (37.41) [7.38]	19.73 (20.06) [4.05]	26.63 (25.62) [5.64]	19.40 (20.39) [4.13]	32.33 (34.45) [4.52]
Behavioral Sciences	141	48.88 (58.21) [16.28]	39.52 (42.86) [9.01]	19.69 (18.30) [5.11]	23.17 (25.05) [5.38]	17.65 (19.00) [3.92]	30.27 (33.32) [5.25]
English Composition	70	71.54 (71.32) [10.62]	49.77 (50.49) [6.69]	15.90 (15.86) [4.60]	31.39 (31.32) [4.00]	22.07 (21.87) [3.89]	29.61 (28.58) [4.71]
<i>Two-Year Colleges</i>							
Laboratory Sciences	87	49.22 (49.21) [12.91]	39.64 (39.63) [9.39]	21.29 (21.29) [6.25]	28.75 (28.75) [5.76]	20.00 (20.01) [4.34]	26.64 (26.66) [6.22]
Behavioral Sciences	101	67.08 (66.89) [10.00]	46.52 (46.27) [7.56]	16.25 (16.31) [4.05]	26.49 (26.60) [5.22]	19.87 (20.18) [4.03]	32.17 (31.17) [4.07]
English Composition	69	64.42 (64.83) [10.07]	48.90 (49.38) [7.93]	16.74 (16.57) [4.87]	29.84 (29.47) [4.92]	20.84 (20.24) [3.91]	31.90 (31.90) [4.63]

College Classroom Environment Scales Means

Disciplinary Area	<i>n</i>	CLC	PC	IA	AR	AF	ST
<i>Private Liberal Arts Colleges</i>							
Laboratory Sciences	106	45.48 (45.50) [13.54]	43.77 (43.69) [10.24]	19.07 (18.98) [5.38]	25.47 (25.45) [6.03]	20.58 (20.37) [3.59]	31.52 (31.17) [4.63]
Behavioral Sciences	58	59.74 (61.93) [10.40]	46.50 (47.61) [6.22]	18.91 (18.25) [4.48]	24.58 (24.69) [4.21]	20.26 (20.38) [3.98]	30.69 (30.21) [4.63]
English Composition	61	66.46 (66.93) [11.08]	48.03 (48.66) [6.67]	19.18 (18.89) [4.38]	30.89 (30.48) [4.79]	22.49 (21.75) [3.20]	28.62 (27.67) [4.84]

Note. Means adjusted for class size are enclosed in parentheses. Standard deviations are enclosed in brackets. CLC = Cathartic learning climate, PC = Professorial concern, IA = Inimical ambience, AR = Academic rigor, AF = Affiliation, ST = Structure.

Table 5
Summary of Stepwise Regression Analysis
for Course Grade in Laboratory Sciences ($n = 182$)

<i>Variable</i>					
<i>Step</i>	<i>Entered</i>	<i>Partial R Square</i>	<i>Model R Square</i>	<i>F</i>	<i>p</i>
1	SAT	0.11	0.11	21.51	.01
2	AF	0.02	0.13	4.41	.04
3	Value	0.01	0.14	2.13	.15
4	IA	0.01	0.15	2.83	.09
		<i>df</i>	<i>Mean Square</i>	<i>F</i>	<i>p</i>
Regression		4	6.03	7.84	.01
Error		178	0.77		
	<i>Beta Value</i>	<i>Std. Error</i>	<i>Type II SS</i>	<i>F</i>	<i>p</i>
Intercept	-0.76				
IA	-0.02	0.01	2.17	2.83	.09
AF	0.02	0.02	2.35	3.05	.08
Value	0.06	0.03	3.02	3.93	.05
SAT	0.00	0.00	19.44	25.29	.01

Note. SAT = Scholastic Aptitude Test (verbal and quantitative combined); IA = Inimical Ambiance Scale; AF = Affiliation Scale; Value = Students' evaluate of course's value as part of total education.

On the Professorial Concern Scale, the primary differences in the interactions appeared related to the degree of disparity among disciplinary areas within different type institutions. The largest disparity on the PC scale was evident at the university, with less disparity at two year colleges and even less at liberal arts colleges.

Students perceived a more hostile climate (higher mean on the Inimical Ambiance Scale) in the laboratory sciences than they did for either the behavioral sciences or English composition at both the university and the two year colleges. At the liberal arts colleges, however, there were virtually no differences in the means for all three disciplinary areas.

Table 6
Summary of Stepwise Regression Analysis
for Course Grade in Behavioral Sciences ($n = 227$)

<i>Total Model $R^2 = 0.24$</i>					
<i>Variable</i>					
<i>Step</i>	<i>Entered</i>	<i>Partial R Square</i>	<i>Model R Square</i>	<i>F</i>	<i>p</i>
1	SAT	0.19	0.19	52.43	.01
2	PC	0.04	0.23	11.62	.01
3	AR	0.01	0.24	3.80	.05
		<i>df</i>	<i>Mean Square</i>	<i>F</i>	<i>p</i>
Regression		3	15.90	723.72	.01
Error		227	0.69		
	<i>Beta Value</i>	<i>Std. Error</i>	<i>Type II SS</i>	<i>F</i>	<i>p</i>
Intercept	-0.18				
PC	0.03	0.01	10.83	15.56	.01
AR	-0.03	0.01	2.55	3.80	.05
SAT	0.00	0.00	39.67	59.18	.01

Note. SAT = Scholastic Aptitude Test (verbal and quantitative combined); PC = Professorial Concern Scale; AR = Academic Rigor Scale.

At all three types of institutions, English composition was perceived as more academically rigorous than either BS or LS, although the differences at two-year colleges between EC and LS were small. Laboratory sciences had a higher mean on AR than did BS at all three types of institutions. The interaction was caused by the much larger differences between EC and the other disciplinary areas at the university and the liberal arts colleges than at the two-year colleges.

On the AF scale the interaction effect showed three dissimilar patterns of means at each of the three institutional types. At the university, EC was perceived as having the most student-center, friendly atmosphere, followed by LS and BS. At the two-year colleges, however, there were virtually no differences among means for the three disciplinary areas. BS and LS had almost identical means on the Affiliation scale at the liberal arts colleges, whereas EC's mean was higher.

Table 7
Summary of Stepwise Regression Analysis
for Course Grade in English Composition ($n = 167$)

<i>Total Model $R^2 = 0.19$</i>						
<i>Variable</i>		<i>Partial R</i>	<i>Model R</i>	<i>F</i>	<i>p</i>	
<i>Step</i>	<i>Entered</i>					
1	SAT	0.13	0.13	24.37	.01	
2	ST	0.04	0.17	6.61	.01	
3	IA	0.01	0.18	2.66	.11	
4	CLC	0.01	0.19	2.31	.13	
			<i>Mean</i>			
			<i>df</i>	<i>Square</i>	<i>F</i>	<i>p</i>
Regression			4	65.14	9.34	.01
Error			163	0.55		
	<i>Beta Value</i>	<i>Std. Error</i>	<i>Type II SS</i>	<i>F</i>	<i>p</i>	
Intercept	-0.05					
CLC	0.01	0.01	1.27	2.31	.13	
IA	-0.03	0.01	2.59	4.71	.03	
ST	0.03	0.01	2.57	4.67	.03	
SAT	0.00	0.00	17.69	32.14	.01	

Note. SAT = Scholastic Aptitude Test (verbal and quantitative combined); ST = Structure Scale; IA = Inimical Ambiance Scale; CLC = Cathetic Learning Climate.

The significant interaction effect on the Structure scale was attributable primarily to the differences in the laboratory sciences. LS was perceived as the most structured at both the university and the liberal arts colleges, but the least structured at two year colleges. EC was perceived as the least structured at the university and the liberal arts colleges, but was tied with BS at the two year colleges.

Classroom Environments and Course Grade

To investigate whether classroom environments affected individual student achievement, separate step-wise regression analyses were performed for each of the three disciplinary areas — laboratory sciences, behavioral sciences, and English composition. Variables initially included in the analysis were the 6 CCES, SAT Scores (verbal and quantitative combined), student's age, the student's evaluation of the instructor's teaching ability, and the student's perception of

the value of the course as a part of his or her total education. A minimum criterion ($p < .15$) was used for a variable to enter and remain in a model.

As may be seen in Table 5, for the laboratory sciences only 4 variables — SAT, Affiliation Scale, Value of the course, and Inimical Ambiance Scale (which loaded negatively) — met the model's criterion. The final model accounted for 15% of the total variance of course grades.

Only the SAT variable was retained in all three models and in all cases it explained more variance in course grades than all other variables combined. The Inimical Ambiance scale remained in two of the final models — laboratory sciences and English composition — in both cases it loaded negatively.

Discussion

Limitations

There are four limitations to this study that should be kept in mind as the results are discussed.

- Data were collected in introductory classes, which means that most students in the study had only limited exposure to higher education. Because introductory classes by their nature are required to spend considerable time explaining basic methodology and terminology, it is difficult to treat subjects in depth, which may cause some students to perceive the discipline as dry and uninteresting.
- Except for part of the liberal arts college data, only southeastern institutions were used in this study. This may introduce an unknown geographic bias to this study.
- Data were collected only from students who were present in class the day the data were collected. No attempt to contact absent students was made. Absent students may have had a more negative view of the class or lower grades than did the students who were attending class on data collection day.
- This study dealt only with students' perceptions, which may or may not be accurate interpretations of classroom dynamics. Perceptions, however, are what students act on whether or not they are accurate.

Institutional Differences in Classroom Climate

When class size was controlled, three CCES means were statistically significantly different among institutional types — Professorial Concern, Academic Rigor, and Structure.

Liberal arts colleges seem to be delivering on their advertising that there are closer relationships between faculty members and students and that faculty show greater interest in and concern for the welfare of their students than is true at the larger university. Two-year colleges fall between these two extremes, showing less professorial concern than liberal arts colleges but more than at the university.

Students enrolled at two-year colleges perceived greater academic demands and higher standards in classes in the three disciplinary areas sampled than did their counterparts at the liberal arts college. Neither of these types of institutions differed, however, from the university in terms of perceived academic demands. The higher degree of academic challenge perceived by two-year-college students may be explained in part by differences in their academic preparation and experience in comparison to students who attended the liberal arts colleges. This suggests that there may be a larger gap between students' academic competencies and faculty performance expectations at two year colleges than is true at either the university or the liberal arts college.

In terms of structure, students enrolled at the university perceived more than did their counterparts at both the two-year colleges and the liberal arts colleges. This suggests that faculty members at the university presented more formalized requirements and expectations to their students than do their counterparts at the other type institutions. This supports the stereotype of universities being large bureaucracies that "operate by the rules." Students, however, may actually prefer this to a more individualized, less formally structured, approach. If Perry's (1970) scheme of intellectual development holds, then students in the late stages of dualism and early multiplicity prefer instructors to spell out *everything* clearly. They have difficulty dealing with ambiguity and the use of qualitative standards in evaluation of performance. A class that is highly structured may well be reassuring and easier for students at these stages of intellectual development to handle. This study, however, did not address the issue of the optimum level of structure needed to stimulate intellectual growth or student satisfaction.

Differences Among Academic Disciplines

This research clearly established that different disciplinary areas create somewhat unique social environments within the classroom. When class size was controlled, differences were found among the three disciplinary areas (behavioral sciences, laboratory sciences, and English composition) in all six of the CCE scales.

Students perceived English composition classes as the most intellectually stimulating and engaging (followed by social science and laboratory science classes in descending order). Instructors in English were perceived as demonstrating the most interest in and concern for individual students and their academic and personal development — followed by behavioral science and laboratory science faculty members. Similarly, English composition classes were perceived as having the most rigorous standards, followed by laboratory science and behavioral science classes respectively. Composition classes were also perceived as being less structured (having assignments and evaluation criteria clearly specified) than either of the other disciplinary areas. (The laboratory sciences and behavioral sciences, however, did not differ significantly from each other in terms of perceived structure.) In addition, laboratory science classes were seen by students as being more hostile and intimidating than either English or behavioral science classes. Finally, students were seen as more engaged with each other and offered greater support and encouragement to classmates in English class than they did in behavioral science classes, but did not differ significantly from laboratory science classes.

These findings suggest that an academic discipline may well create an unique classroom social climate. Given the fact that most post-secondary education faculty members have received limited academic preparation in the art and science of teaching, however, the learning climate created may well be a matter of tradition rather than purposive pedagogical practice. Whether this reflects conscious intentions on the instructor's part or represents "best practice" in instruction is a subject for future research. This research found that the kind of social climate perceived by students did have an effect on their grades, which we may assume also reflects the quality and/or quantity of learning.

Classroom Environments' Effects on Grades

The regression analyses in all three disciplinary areas demonstrated that students' perceptions of the classroom environment make

small, but significant, contributions to their final course grades. As would be reasonably expected, academic aptitude, as measured by the SAT, accounted for most of the variance in course grades across disciplinary areas.

In laboratory science classes, students made higher grades in classes where they knew each other and cooperated in learning (high on Affiliation scale) and did not feel a hostile, personally threatening climate during classroom interactions with other students and the instructor (low on Inimical Ambiance scale). Students also made better grades in the course if they valued it as an important part of their total education.

In behavioral science classes, students performed better in classes where they perceived the instructor as warm and friendly and as caring about them as individuals (high on Professorial Concern scale). They also made higher grades in classes where they perceived less exacting academic standards (low on Academic Rigor scale).

In English Composition, students made higher grades in classes that had clearly (in their view) specified expectations and evaluation standards (high on Structure scale), that created interactions among other students and with the instructor which were not hostile or personally demeaning (low on Inimical Ambiance scale), and that was intellectually stimulating, fast paced, and encouraged a lively interaction with classmates (high on Cathectic Learning Climate scale).

If the goal of instruction is to encourage or facilitate student learning, then it seems clear that instructors should carefully examine the kind of social climate that is created in their classrooms and whether that climate is likely to promote or detract from learning. Additional research is needed on experimental studies that could evaluate intentional approaches as directly addressing the social climate can in fact create more conducive learning environments for students.

Interaction of Disciplinary Area and Institutional Type

Another important finding from this study is that different types of educational institutions have an influence on classroom climate and that effect is different across disciplinary areas. In other words, before designing an intervention to affect the learning environment of a particular class it is essential that the researcher/instructor

understand the culture of the institution at which he or she works and its students. Much more research is needed to investigate the particular interactions among institutional culture, academic discipline, and student population and how they differentially influence the climate for learning in the classroom.

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