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MID-WESTERN EDUCATIONAL RESEARCHER

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The University of Akron

On the Cover

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The authors will be consulted if any major changes are necessary.

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Development of Attitude Toward Teaching Career

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Abstract

The purpose of this longitudinal study was to investigate whether selected academic ability indices and personal characteristics of 117 teachers were associated with changes in their attitude toward teaching as a career measured upon the commencement of teacher preparation, the end of student teaching, and upon completion of their fifth year of teaching. Mixed model two-way ANOVA procedures revealed that the attitude toward teaching of the neophyte teachers remained stable and positive during teacher preparation but were less positive near the end of their fifth year of teaching; that ACT scores, Rotter's locus of control, Myers-Briggs Type Indicator preferences, gender, when the decision to teach was made, and the initial degree of assurance about becoming teachers were associated with attitude toward teaching as a career; and statistical interactions were identified, revealing contrasting changes in attitude development during teacher preparation for candidates with different personal characteristics.

The continued emphasis upon accountability and pupil competence in public education increasingly raises concern about teacher quality and development. This concern has resulted in several recent efforts to consolidate and reassess existing theory and research on teacher development. For example, Firestone and Pennell (1993) reviewed approximately 30 studies investigating relationships between working conditions and the development of commitment to the teaching profession, Brookhart and Freeman (1992) analyzed more than 40 studies of the nature of entering teachers for common research themes and procedures, and Kagan (1992) examined approximately 50 studies of preservice and beginning teachers for relationships with various theoretical models of teacher development.

Among the common themes noted in the aforementioned integrative interpretations of the existing teacher development research literature were an increasing number of studies evolving from theoretical models of teacher development, such as Fuller's (Fuller and Bown, 1975) model of the development of teaching concerns and Berliner's (1988) model of teacher cognitive development; a recognized need for, but relative absence of, longitudinal studies of teacher development; and the growing acceptance of the presence and understanding of stages in teacher career development. Within these studies, teacher career development was viewed as changes in teachers' job skills, knowledge, and behaviors; changes in attitude and outlooks; and changes in job events (Burden, 1982). Evidence from these studies indicated that these changes follow a developmental pattern and interact with teachers' beliefs, prior experiences, and personality (Bendixen-Noe and Redick, 1995; Kagan, 1992).

In the present study, attitude toward teaching as a career was investigated using a sample of teacher candidates as they progressed through teacher preparation and the early years of their classroom teaching. Research on attitude development in teacher candidates suggests a pattern of change from early formalized and rigid attitudes toward teaching to a more liberal, democratic, and humanistic attitude about

teaching in mid teacher preparation and returning to the former rigid control of pupils orientation following student teaching and early teaching responsibilities (Callahan, 1980; Hogben and Lawson, 1984; Hoy and Woolfolk, 1990; Lipka and Garlet, 1981). Hoy and Rees (1977) suggest that this regression to an earlier attitudinal position following early teaching experiences may simply result from the teacher candidates' return to the conformity of the conservative, bureaucratic behavior norms of the public schools. In contrast to these research findings, some cross-sectional studies of preservice and inservice teachers have revealed stable attitudes, or even positive changes, rather than negative changes in attitude toward teaching during the transition from students to teachers (Marso and Pigge, 1989; Paschal and Treloar, 1979; Sandgren and Schmidt, 1956). The danger inherent in these studies is that many teacher candidates who had experienced an abrupt decline in attitude toward teaching may have already left the profession before the measurement points and, therefore, do not appear in the later inservice samples of teachers.

The aforementioned discrepancies in research findings may be explained by suggestions that attitude development, like more general teacher development, is influenced by prior personal experiences and individual characteristics of the prospective teachers and by characteristics of the employing school (Tabachnick and Zeichner, 1984; Zeichner, 1980). Some empirical evidence exists which supports this explanation. For example, Villeme and Hall (1980) and Pigge and Marso (1987) reported that teacher candidate gender and grade level of instruction are related to their attitude toward teaching. Also, Byler and Byler (1984) revealed relationships between extent of student teachers' prior field experience, student teachers' own expectations of their experience, and characteristics of cooperating teachers and the attitudes and morale of student teachers. Regarding the extent of field experience factor and its possible impact upon teacher candidate attitudes, Gibson and Coleman (1997) reported that most schools of education have increased field requirements

for teacher candidates. This change in itself may account for some of the differences in the results of the studies conducted at different times.

Relative to the broader question about the importance of teacher attitudes, relationships have been found between teacher attitudes and success in the transition from students to teachers as well as between attitudes and classroom teaching behaviors. VILLEME and HALL (1980) reported that candidates with more positive attitudes toward teaching and with higher grade point averages were more likely to actually enter the teaching field; RAMSAY and RENSLEY (1986) found that teacher attitudes influenced the achievement of their pupils; SORENSON, SCHAEFER, and NYMAN (1966) reported that teacher attitude was related to teacher persistence in the profession; BUNTING (1988) noted a relationship between teacher attitudes and choice of instructional procedures; FRIESEN, PROKOP, and SARROS (1988) reported a relationship between negative attitudes (e.g., depersonalization) and teacher burn-out; and NOAD (1979) identified a relationship between teacher attitudes and their pupils' ratings of their teaching performance. Additionally, WILKINSON (1994) states that newly qualified teachers have an "alarmingly high" attrition rate; VALLI (1992) indicated that beginning teachers experience more classroom problems and experience them more profoundly than do experienced teachers; and CHESTER and BEAUDIN (1996) state that it is "well documented" that teachers' self-efficacy beliefs and attitudes toward teaching change during their first year of teaching.

In summation, the developmental perspective of teacher evolution suggests that attitude toward teaching will change during teacher preparation and the initial years of teaching, and research findings derived from cross-sectional samples indicate that teacher attitudes may be related to both teacher attrition and the performance of their pupils. The research literature also suggests that various academic and personal attributes of teacher candidates, as well as the nature of the teaching setting itself, may interact with the development of teacher attitudes. The purpose of the present study was to further investigate selected academic ability and personal characteristics of teachers that may be associated with changes in attitude toward teaching for a longitudinal sample of teacher candidates as they progressed through preparation and the initial years of teaching.

Method

The sample for this study was comprised of 117 neophyte teachers who completed the Attitude Toward Teaching as a Career measure at the commencement of teacher preparation, near the end of their student teaching practicum, and again near the end of their fifth year of teaching. This 11-item attitude scale provides a single score responded to on a continuum from strongly disagree '1' to strongly agree '6'; thus, a score of 66 represents the maximum positive attitude score from this instrument. This instrument is unique in the measurement field in that it provides discriminant

validity related to career choice, and more recent research (Pigge and Marso, 1992) has indicated that the scale differentiates between teacher candidates persisting or not persisting through teacher preparation. It is a situation specific scale based upon need theory and the attitude-concept view of attitude structure. Scores from the scale are conceptualized as a function of the individual-belief value matrix wherein attitudes evolve from perceptions that the attitude objects block (negative) or facilitate (positive) need satisfaction. From a teacher development perspective, one could hypothesize that teacher candidates should show an increasingly positive attitude toward teaching as a career as their knowledge and skills develop during teacher preparation and that this positive attitude should remain stable during the initial years of teaching.

The following data also were gathered from the subjects during teacher preparation: American College Test (ACT) and Comprehensive Test of Basic Skills (CTBS) composite scores, university and education grade point averages, Rotter's (1966) externality locus of control scores, university supervisors' ratings of their student teaching performance, and Myers-Briggs Type Indicator personal preference classifications (Myers and McCaulley, 1985). The CTBS is one of the most frequently used K-14 grades standardized achievement batteries with a focus upon assessment of reading skills, language acquisition, and mathematical computations and concepts. The ACT was developed by the American College Testing Program, and it has been one of the two major undergraduate college admissions tests used in the country over the past three decades. The Rotter and Myers-Briggs instruments have been heavily used for various research purposes over a period of many years, and both have been found to be related to various teacher characteristics. Similarly, the gender, grade level of instruction, and time when the decision to teach was made classifications have been found to be related to teacher persistence (Marso and Pigge, 1997) and have been suggested as factors to be considered in recruiting teacher candidates (Hutchinson and Johnson, 1993-94).

The researcher developed university supervisors' scale for rating student teachers' performance encompasses assessments in six performance categories: presents content effectively; effectively plans, prepares, and organizes instructional activities; maintains a positive learning climate; maintains appropriate student behavior; displays professional knowledge and behavior; and shows fairness, tact, compassion, and good judgment. Each of these performance categories is accompanied by behavior descriptions of the types of student teachers' performance to be assessed. The six items are responded to on an eight-point scale from the worst '0' to truly exceptional 7, yielding a total score from zero to 42. The scale directs the university supervisor to rate the current student teacher relative to the typical performance of all student teachers supervised over the prior five years.

This sample of teacher candidates was beginning its teacher preparation at a large Midwestern teacher prepara-

tion institution. The candidates were predominately white (98%), female (81%), elementary (57%) and secondary (43%) majors, very certain or almost certain about teaching (88%), and from rural (33%) or suburban (54%) high schools of moderate to small size (61% with high school graduating classes of 300 or less). Most of the candidates were employed in schools similar to those from which they had graduated.

Mixed-model two-factor ANOVA procedures with one repeated measures factor were used to analyze the data. The three points of time in teacher development, prior to and following teacher preparation and at the end of the fifth year of teaching, comprised the repeated measures factor independent variable. The various academic ability indices and personal attribute classifications of the teachers were used as the second independent variable. In all analyses, the attitude scores were used as the dependent variable.

The specific row classifications used in the 3x2 and 3x3 ANOVA procedures for the academic ability and personal attribute classifications were approximate high and low halves of the academic ability indices derived from the ACT and CTBS composite scores, the university and education grade point averages, and the student teaching performance ratings; the dichotomous personal classifications of gender, grade level of instruction (elementary and secondary), Myers-Briggs' personal preference types (extraversion-introversion, sensing-intuition, thinking-feeling, and judging-perceptive); and three level classifications from Rotter's locus of control (approximate top, mid, and low one-thirds of the externality scores) and from when the teacher candidates first decided to become teachers (prior to, during, or following the high school years).

Results

The results of the ANOVA procedures indicated that the teachers' attitude toward teaching as a career changed during this period of teacher development. As shown in Table 1, the overall attitude means for these three points in career development were almost identical from pre- to post-teacher preparation, but by the fifth year after graduation the teachers' attitude toward teaching as a career had become less positive ($F = 5.06, p = .0071$). The series of ANOVAs also revealed significant row main effect or interaction F ratios for 6 of the 15 subject academic and personal classifications. It can also be observed in Table 1 that the time variable was significant each of the six comparisons presented (p 's from .0004 to .0122). Post-hoc pair-wise mean comparisons via a Scheffe test ($\alpha .10$) revealed no significant differences between the sophomore and senior means, but both of these sets of means were higher than the means after the fifth year of teaching.

Assurance About Teaching Classification

The assurance classification revealed an overall attitude mean difference among the very certain, certain, and uncertain about teaching candidates, $F = 5.82, p = .0039$ but re-

vealed a nonsignificant assurance χ time interaction as shown in Table 1. The post-hoc pair-wise mean comparisons indicated no difference between the certain and the other two groups of candidates, but the uncertain candidates differed from the very certain candidates. Those teachers who were more assured of their decision to become teachers upon commencement of preparation reported more positive attitudes toward teaching at all three measurement points as can be seen in Table 2. It can also be seen in Table 2 that the standard deviations for the attitude scores for the assurance, and all other significant classifications, were most diverse at the end of the fifth year of teaching. This increased diversity in attitude toward teaching suggests that the classroom teaching experience may have been satisfying the needs of some candidates but likely not for other candidates. It also can be noted that attitude diversity was greater within the groups of teachers who had reported being uncertain ($SD = 10.47$) and certain about teaching ($SD = 9.03$) as compared to those who had reported being very certain ($SD = 7.94$) about teaching upon commencement of teacher preparation.

Locus of Control Classification

The locus of control main effect did not reach statistical significance ($F = 2.05, p = .1364$)¹¹ however, the locus of control χ time in career interaction effect was significant ($F = 2.64, p = .0359$) as reported in Table 1. The pattern of these means and accompanying effect sizes as shown in Table 2 and Figure 1 indicates that the high externality teachers, those teachers feeling they had little control over their environment, reported less positive pre- and post-preparation attitudes but somewhat more positive attitudes after teaching as compared to the low and mid externality teachers. The low and mid externality candidates reported higher attitudes during teacher preparation followed by declines in positive attitude from end of preparation to the fifth year of teaching ($ESs = 1.10$ and $.49$, respectively, see Figure 1) while just the opposite occurred for the high externality group ($ESs = .27$). Typically, effect sizes (ES) of $.20$ to $.50$, $.50$ to $.80$, and $.80$ plus are considered small, medium, and large.

As can be seen in Figure 1, the decline in attitude toward teaching was particularly sharp for the low externality ($ESs = 1.10$), those internally oriented teachers who felt they had considerable control over their environment, candidates. This interaction suggests that the high externals found' classroom teaching to be a more need satisfying experience than what was expected; whereas the low externality candidates in particular found their early teaching experiences to be much less satisfying than anticipated. Perhaps these internally controlled teachers found that they, themselves, could not control the teaching setting as much as they had anticipated. This finding may be particularly significant as other researchers have reported that internally controlled teachers, as might be expected by definition of the internal orientation, feel more responsible for the progress of the pupils (Ashton, Webb, and Doda, 1983) and have pupils who achieve higher than pupils of external teachers (Murray and

Table 1
2x3 and 3x3 ANOVA F Values for the Attitude Toward Teaching as a Career Means at Three Times in Teacher Development and for Seven Classifications of Teachers

<u>Time in Teacher Development</u>		<u>Subject Classifications</u>					<u>Interaction</u>				
		<u>Assurance Teach</u>		<u>Time x Assurance</u>							
<u>Soph.</u>	<u>Senior</u>	<u>5th year</u>	<u>df</u>	<u>F</u>	<u>p</u>	<u>Very Certain</u>	<u>Certain</u>	<u>Uncertain</u>	<u>df</u>	<u>F</u>	<u>p</u>
52.24	52.26 *	49.79	2,228	5.06	.0071	52.67	50.84	48.07	2,114	5.82	.0039
52.47	52.55	49.71	2,148	4.74	.0102	<u>External Locus of Control</u>					
						<u>Low</u>	<u>Mid</u>	<u>High</u>			
						53.28	51.22	50.22	2,74	2.05	.1364
52.73	52.73	49.79	2,156	7.35	.0009	<u>ACT</u>					
						<u>High</u>	<u>Low</u>				
						52.99	50.69		1,78	4.36	.0401
52.51	52.55	49.82	2,200	4.51	.0122	<u>Myers-Briggs Preferences</u>					
						<u>Judging</u>	<u>Perceptive</u>				
						52.27	49.13		1,100	7.86	.0061
52.51	52.55	49.82	2,200	8.22	.0004	<u>Myers-Briggs Preferences</u>					
						<u>Extrovert</u>	<u>Introvert</u>				
						52.41	49.98		1,100	6.22	.0142
52.33	52.56	50.86	2,200	7.51	.0007	<u>Myers-Briggs Preferences</u>					
						<u>Sensing</u>	<u>Intuitive</u>				
						52.67	51.29		1,100	4.93	.0287

* Means above the same line do not differ significantly, Scheffé post-hoc tests, α .10.

Table 2

Means, Standard Deviations, and Ns for Classifications of the Teachers Revealing Differences in Attitude Toward Teaching as a Career at the Three Times in Development

Subject Classifications		N's	Time in Teacher Development					
			Sophomores		Seniors		5th Yr. Teaching	
			M	SD	M	SD	M	SD
Assurance:	Very Certain	59	54.00	5.04	52.76	6.12	51.24	7.94
	Certain	44	51.93	4.30	51.98	4.83	48.62	9.03
	Uncertain	14	45.79	6.46	51.07	3.99	47.35	10.47
Locus of Control:	Low	22	54.95	5.00	55.55	4.58	49.33	10.51
	Mid	37	52.27	6.14	52.08	4.80	49.31	8.68
	High	18	49.83	5.54	49.83	5.82	51.01	7.35
ACT:	High	37	53.03	5.60	54.41	5.07	51.53	7.16
	Low	43	52.49	6.06	51.28	5.75	48.29	9.16
Myers-Briggs:	Judging	81	53.33	5.63	53.09	5.50	50.40	8.52
	Perceptive	21	49.33	4.78	50.48	4.59	47.59	7.99
	Extrovert	69	53.46	5.13	52.83	5.60	50.95	7.24
	Introvert	33	50.51	6.32	51.97	5.01	47.47	10.27
	Sensing	50	53.42	5.35	52.82	5.84	51.76	7.51
	Intuitive	52	51.63	5.90	52.29	5.00	49.96	8.95

Staebler, 1974). Consequently, this interaction may suggest that the transition from students to teachers may be most difficult attitudinally for those teachers initially most positive about becoming teachers and who become most concerned about the progress of their pupils.

Academic Ability Classifications

The CTBS, university and education grade point averages, and the student teaching performance row classifications of the teacher candidates did not result in statistically significant main or interaction effects. The ACT classification, however, revealed a significant main effect mean difference but a nonsignificant interaction effect. The high ACT

candidates reported a more positive attitude toward teaching than did the low ACT candidates, $F = 4.36$, $p = .0401$ as shown in Table 1. The attitude means at the three career points, as reported in Table 2, indicate that the difference in attitude between the high and low ACT groups was barely evident at the commencement of preparation but was more evident both at the end of teacher preparation and the fifth year of teaching. Both the high and low ACT candidates reported their least positive attitudes at the end of the fifth year of teaching. The low ACT candidates, however, reported somewhat less positive attitudes at all three career points and reported the larger decline in attitude over the seven-year period.

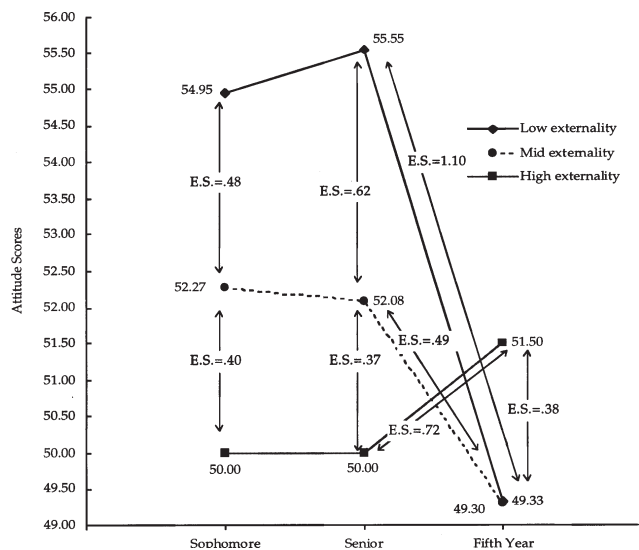


Figure 1. Time in Teacher Development x Locus of Control Orientation

Myers-Briggs Preference Classifications

Three of the four Myers-Briggs classifications resulted in significant main, effect attitude mean differences, but none of the time in career χ Myers-Briggs classification interactions were significant (see Table 1). The perceptive candidates, those preferring a flexible and spontaneous way of life, reported a less positive attitude than the judging candidates who prefer a more planned and orderly way of life, $F = 7.86$, $p = .0061$. The extroverted candidates, those preferring the outer world of people and things, reported a more positive attitude toward teaching than the introverted candidates, those preferring the inner world of ideas, $F = 6.22$, $p = .0142$. And the sensing candidates, those preferring to work with known facts, reported a more positive attitude about teaching than the intuitive candidates who prefer to work with possibilities and relationships, $F = 4.93$, $p = .0287$ as shown in Table 1. As noted earlier, the standard deviations for the attitude scores after the fifth year of teaching were larger than at the two earlier career points.

It can be noted from Table 2 that the majority of these candidates were classified as judging and extroverted rather than perceptive and introverted, but the candidates were rather evenly divided within the sensing-intuitive classification. The nonsignificant interaction effects identified in Table 1 suggest that none of these preference classifications of the teachers revealed variations in attitude other than the previously reported small general decline from the end of preparation to the end of the fifth year and even though greater diversity of attitudes was reported after teaching as compared to the two preservice measurement points.

Summary and Discussion

Differences in attitude toward teaching as a career were identified across the three career development points in this

longitudinal study of 117 teacher candidates. Attitudes toward teaching remained stable and positive between the commencement of teacher preparation and the end of the student teaching practicum, but attitudes toward teaching became less positive between the completion of the student teaching practicum and the fifth year of teaching. Also considerably more diversity in attitude was noted at the fifth year of teaching than at the two earlier career points. The finding of no gain in positiveness of attitude during teacher preparation and the decline in positiveness of attitude from the end of teacher preparation to the fifth year of teaching is contrary to the presumptions underlying the attitude measure and related developmental theory. Attitudinal theory models suggest that attitudes toward teaching should become more positive as novice teachers develop their professional knowledge and teaching skills and as they find that teaching satisfies their needs.

Just the ACT classification among the selected academic ability indices was found to be related to the teacher candidates' attitude toward teaching. The teacher candidates with higher ACT scores reported higher levels of attitude toward teaching than did their cohorts with lower ACT scores. The CTBS scores, university and education grade point averages, and student teaching performance ratings classifications were not found to be related to the candidates' attitude toward teaching. This lent scant support for the question of a relationship between attitude development and academic performance indices of teacher candidates.

Among the personal classifications of the teacher candidates, the assurance about teaching, locus of control orientation, and the Myers-Briggs preference classifications were found to be related to the novice teachers' attitude toward teaching as a career providing somewhat more support for the question of a relationship between attitude development and candidate personal traits. The gender, secondary or elementary school major, time of decision to teach, and presence or absence of teachers in the family classifications were not found to be related to the teaching candidates' attitude toward teaching. Generally, these findings related to candidate characteristics indicated that those more confident about the decision to teach, those feeling they can influence their world (an internally rather than an externally controlled orientation), those extroverted rather than introverted, those sensing rather than intuitive (preference for known facts versus possibilities), and those judging rather than perceiving (preference for flexible versus planned way of life) reported more positive attitudes toward teaching.

The single significant interaction identified in the ANOVA procedures suggested that the main effect of attitude development over the three points in career development cannot be interpreted accurately without considering the candidates' locus of control orientation. The presence of the locus of control χ time in development interactions might in part explain some of the inconsistencies of findings in previous research. For example, in this study the low externality (internally controlled) candidates' reported

the most positive attitudes during preparation but the greatest reduction in positiveness of attitude between the end of teacher preparation and the end of the fifth year of teaching as compared to their mid or high externality cohorts. Consequently, it might be that some but not all teachers follow the developmental conception of teacher attitude. In other words, some teachers may report a more positive attitude toward teaching during their developmental years; whereas others report a less positive attitude during these years.

Greater diversity in attitude toward teaching was found at the end of the fifth year of teaching compared to the pre- and post-teacher preparation points in career development. For all classifications of the neophyte teachers, the standard deviations were greater for the fifth year of teaching attitude scores than for the attitude scores obtained prior to or following teacher preparation. The standard deviations for the attitude scores at the fifth year of teaching were approximately twice the magnitude of the standard deviations for attitude scores obtained prior to or at the end of teacher preparation within the various academic or personal classifications of the teachers. This would appear to further support the suggestion that some teachers report more positive and some less positive attitudes toward teaching during their developmental years.

In summation, attitude toward teaching as a career remained constant during teacher preparation but became less positive between the end of teacher preparation and near the end of the fifth year of classroom teaching for this sample of teachers. Perhaps this general decrease in positive attitude as well as the increased diversity of attitude scores noted at the fifth year of teaching reflects the challenge and demands of a profession characterized by stress, burnout, and high attrition rates as well as personal attributes including locus of control orientation. The attitudes of these candidates were found to be related to 6 of the 15 academic and personal characteristics selected for study. These findings support the findings of Tabachnick and Zeichner (Tabachnick and Zeichner, 1984; Zeichner, 1980) and further emphasize the role of personal traits in teacher development. Relatedly, and perhaps of particular concern, was the finding in the present study that the internally controlled candidates, noted in previous research as feeling more responsible for pupils (Ashton, Webb, and Doda, 1983) and having higher achieving pupils (Murray and Staebler, 1974), reported relatively more abrupt declines in the positiveness of attitude toward teaching from the end of teacher preparation to the end of the fifth year of teaching than did their cohorts. This suggests that our more desirable teachers might most suffer in the transition from students to teachers and, as a consequence, may be most prone to leave the profession.

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Using Action Research to Facilitate School Improvement

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Abstract

This study describes a joint project between a mid-sized urban school district and local university. Specifically, district and university personnel collaborated to provide action research training for building leadership teams. A multi-method approach was used to identify the barriers and facilitators of the use of action research training as a method for teachers to create school improvement. A content analysis of the action research plans that were a summative product of the training is provided. Findings include the importance of both technical research skills and attention to the provision of time as a resource for those involved with school improvement efforts.

Introduction

Along with persistent demands for rigorous academic standards, a recurring theme in current calls for educational reform is the need to involve local schools and districts in planning for school improvement. A decade after the release of *A Nation At Risk*, Terrel H. Bell, former Education Secretary and co-author of the report, acknowledged that as a result of the ineffective top-down reform characteristics of the 1980s, “changes in decision-making authority have been sweeping the nation” (1993, p. 595). Bell is unaware of any major American school system that does not have a campaign underway to strengthen site-based management of schools. In fact, varying models of educational decentralization are “in vogue” among many Western nations (Caldwell, 1992; Winkler, 1993). Although the extent to which site-based management is implemented varies from district to district, it is apparent that the trend toward local governance of schools is redefining the roles and responsibilities of teachers, parents, administrators, and other members of the local school community.

Review of Relevant Literature

A fundamental element of site-based management models is one or several strata of school-level governing bodies that are comprised of administrators, teachers, parents, and community members. These stakeholders are presumed to be the most knowledgeable individuals when it comes to identifying and establishing effective learning environments for students at a particular school (Carlos and Amsler, 1993; Marburger, 1990; Mojkowski and Fleming, 1988). Behind the thrust for school-based governance councils is the principle of participatory democracy. Theoretically, greater participation in decision-making helps build consensus for certain reforms, thus ensuring that changes reflect the judgments and expertise of those directly involved in the teaching-learning process (Carlos and Amsler, 1993; Kreps, 1986; Owens, 1987; Ramirez, Webb, and Guthrie, 1991). As schools adopt participatory decision-making models, stake-

holders in the school improvement process have been compelled to develop skills and techniques that promote effective group communication, consensus building, and problem solving (Bailey, 1991; Gresso and Robertson, 1992; Schlechty, 1990).

Not surprising, the emphasis on educators as decision-makers has fostered a renewed interest in the concept of action research. First popularized by Kurt Lewin in the 1940s, action research has endeavored to create a space in the research process for individuals who have been traditionally viewed as non-researchers (i.e., teachers and administrators). Examples of exploratory action research activity have been many and varied, and research collaborations between schools and universities world-wide have been documented throughout the United States and abroad (King and Lonnquist, 1992, 1994; Noffke, 1997). Widespread interest and study notwithstanding, the use of action research, as a school improvement model, has yet to become either well understood or well established in schools.

Purpose and Context of the Study

This study considers both the process and product of the school improvement endeavors in a mid-sized urban school district. Several years earlier, the district had adopted a site-based management system in which administrators and teachers assumed responsibility for the educational outcomes in their buildings. To facilitate this restructuring effort, building leadership teams were established in each school. The initial progress of the building leadership teams was slow and inconsistent, so the school district teamed with a local university to provide training for the school improvement teams. The intent of the training was to help building leadership teams develop communication and action research skills that would be useful for the teams as they developed a written school improvement plan. This study describes the collaborative efforts of the school district and university to provide the action research training. Specifically, the purpose of the study was twofold: (1) to identify the barriers and facilitators of the use of action research skills as a method

for teachers to create school improvement, and (2) to conduct a content analysis of the school improvement plans that were a product of the action research training.

Methods

Participants. Fourteen building leadership teams (3 high schools, 3 middle schools, and 8 elementary schools) participated in the action-research training. Each building team was comprised of the building principal or assistant principal, a parent (usually a PTA member), teachers, and other support personnel (primarily guidance counselors). One of the teachers on each team served as the *official* union representative. In addition to the 104 school-based participants, several district administrators, the union association president, representatives of the PTA, and three university professors assumed various roles throughout the training.

Action Research Training. The training was initiated during a two-week summer workshop. A senior district administrator and university professor assumed responsibility for developing the training sessions, and they selected a number of commercially available materials (ASCD, 1994; Calhoun, 1994; Sagor, 1992). The two-week training was actually conducted by a collaborative team of district and university personnel. The essence of the training was a five-step action research process of problem formation, data collection, data analysis, reporting results, and action planning. In addition to this technical training participants received training in team building and communication skills.

Following the summer training, monthly follow-up sessions were held. The purpose of these sessions was to provide additional support and address specific issues that teams encountered as they began to implement the action research process in their respective schools. Teams were afforded the opportunity to share ideas and experiences and provide support to members of other teams throughout the district. During this four-month time period, facilitators were available to work with individual schools. A total of 38 site visits were made to 10 of the participating schools. These 10 schools had requested some form of support from a facilitator (e.g., assist with data analysis, lead focus group, etc.). Several months into the training, each team was required to develop and submit a written action research plan. Presently, district and university personnel are continuing to work with individual teams and at least one more group session is planned.

Procedures

A multi-method approach was used to evaluate the process and product of the action research training. First, a somewhat traditional closed and open-ended questionnaire was administered at the completion of the two-week training program. The purpose of the instrument was to assess the participants' perceptions of their readiness to undertake action research initiatives at their respective schools. The

questionnaire was administered several months later to gauge changes in attitudes and perceptions.

Next, interview data were collected and field notes were developed after each follow-up session and throughout the subsequent months as the building teams began to implement the action research steps. The field notes included session agendas, participant's work to date, and short interview style quotes that were generated during large group discussion (Yin, 1984, Merrimam, 1990). Focus group interviews (Kruger, 1988) were used to develop the teams shared perceptions of the action research process and were compared to the individual perceptions gathered (Miles and Huberman, 1994). From this data set teachers' and administrators' perceptions of the barriers and facilitators of employing an action research process to the study of school improvement were generated.

Finally, a content analysis of the action research plans was conducted. A thematic analysis of the manifest components of the plans revealed the status of the school improvement endeavors across the teams and provided evidence for evaluating the efficacy of the training.

Results and Discussion

Initial Training. At the conclusion of the summer workshop training, the members of the school improvement teams were excited and motivated about the endeavor that lay ahead. They were generally very confident about their abilities to implement action research in their schools, and they were quite satisfied with the personal and professional development that the training afforded. The participants expected that the knowledge and skills they gained during the training would be useful both during the initial stages of implementing school-based management and in sustaining their efforts. Many of the participants commented enthusiastically on the partnership between the district and university personnel. The joint endeavor was seen as a positive and worthwhile venture. Without hesitation, the component of the training that they valued most was the time to work cooperatively within and across schools teams.

Follow-up Training Sessions. The analysis of the qualitative interview data that were generated during subsequent training sessions suggests that time was the major barrier to successful development and implementation of a school improvement plan. Lack of time to think, talk among team members, and prepare and analyze data collection tools were cited as significant barriers to the improvement effort and hampered both individual and team goals.

Additionally, the qualitative data provided some insight into issues of teacher and principal empowerment as a result of the action research effort.

Time. If there is any consensus in the school improvement literature on the single most important structural support teachers could receive, it is that of time (Caldwell and Spinks, 1992; Hargreaves, 1994; Little, 1993; Raywid,

1993). The findings of this study are no different. However, what our results suggest is that additional time to work on improvement efforts is necessary, and the use of the time spent must be considered. As others have already found, the provision of time to meet and plan may result in changes in terms of curriculum planning and classroom innovation, it cannot guarantee innovation (Louis and Miles, 1990). The same is true of action research efforts. Adequate time to meet and study may improve the chances that quality research efforts will result; however, time alone cannot ensure success.

One way to consider this issue is to consider time as it is experienced in schools. For the teachers in this study, and teachers elsewhere, the lived time of the classroom and school day is intense. Daily, many decisions must be made and often little ‘research’ goes into the decision-making process that results in daily classroom bound decisions. Thus, it is natural for teachers to fall back on these kinds of decision-making processes when approaching an action research project as well. However, as we reviewed the data collection tools and subsequent analysis of school based data we found that quick immediate “peeks” at the information collected is not sufficient to create shared understandings of either the problems to be studied or solutions to be explored.

Teacher Empowerment. While teachers reported that they felt “empowered” by the research tools the training provided, school politics and structural concerns (time to meet and plan, shared understandings of school mission and values) dominated the focus group interview sessions. Furthermore, the focus group interviews suggested that the pressures of teaching in an urban district exacerbated even minor analysis efforts. In particular, meetings scheduled to analyze data often became “emergency” sessions to troubleshoot the daily concerns of managing an urban school population. However, there were many bright spots among the interview data as well. Team members reported feelings of efficacy in both the use of “research skills” to analyze school-based data and the development of the team approach as a method to collectively examine school issues. Focus group data reinforced the emotional, social and intellectual support members had gained during the study’s progress.

Principal Empowerment. While principals may have experienced some relief at the prospect of sharing the burden of school reform and change efforts, they also did not reevaluate what the role changes meant in terms of their positions of school leadership. Being freed from “having to know all the answers” in and of itself doesn’t free an administrator from the role of keeping the school moving toward its improvement goals. Thus, they found themselves trapped in a common dilemma—how to empower staff while still leading the group toward shared reflection and progress. Moreover, this is a second example of a lack of technical skill albeit of a different kind. The principals lacked the technical skills to renegotiate their new roles in addition to the technical skills to prepare the action research report documentation. Therefore, while they may have delighted in the

ability to “share the burden” they were unable to take the freedoms a lightened burden afforded and channel that energy elsewhere in the school organization.

Analysis of the Action Research Plans. At the conclusion of the follow-up session, the teams were required to submit a written action research plan. It was made clear by the facilitators that the written plans were “working documents” and that in all likelihood, teams would be at different points in the action research process. Although the teams were instructed to follow the guidelines suggested in the ASCD training materials, there was no attempt to prescribe the exact format that the teams should follow in writing their plans. It seemed reasonable to expect, however, that each plan would contain a problem statement, data collection and analysis methods, and action steps since both the ASCD materials and the facilitators’ directions explicitly identified these components.

Organization and Format. Although the plans did contain similar components, they were also characterized by a considerable amount of variability. Each plan was uniquely organized, varied in both the depth and breadth of information provided and the amount and type of ancillary materials included (e.g., mission statements, sample questionnaires, data analyses, etc.). An initial examination of the plans revealed two distinct organizational patterns. One group of plans (a total of eight plans) were logically-organized and professional-appearing of 10-15 pages in length. These building teams documented their work with a variety of support materials, and all but one of the plans contained a list of the team members. Two of the plans in this group were submitted in nicely-bound notebooks with colorful covers and seemed to convey a special sense of school pride. In contrast, the other group of plans (a total of six plans) clearly stood apart from the others. Of this group of six plans, five of the plans were more like executive summaries of the teams’ progress to date, and their lack of description documentation (1-5 pages) or organizational structure made them difficult to analyze and evaluate. The sixth plan was simply a conglomeration of documents (i.e., minutes from meetings, memos, several questionnaires, a ballot of some sort, etc.). This plan had no logical order or structure to it.

Problem Statement. Each of the plans identified a problem that would serve as the focus for the research plan. Only two of the plans described problems that were *directly* related to learning “improving math proficiency” and “improving language arts and writing” respectively. Interestingly, six of the plans identified *achievement criteria* as the goal (i.e., raising standardized test scores, increasing grade point average, and increasing attendance rates). Three schools identified goals that are somewhat tangential to student learning (i.e., safety, and school climate). Finally, three teams identified the need to improve faculty communication as their problem. The focus on performance criteria such as test scores and attendance rates is noteworthy. One might argue that students who attend school regularly and perform well on standardized measures are more likely to have mastered

the skills and knowledge that will prepare them for the workforce or post-secondary education. Or, one might contend that schools today are pressed to use hard data to demonstrate “evidence” of school improvement.

Both the workshop facilitators and the training materials stressed the need to consider the professional literature as teams began to clarify and focus their problem statements. Nevertheless, only one team indicated that they planned to consider the literature related to their problem area. Of course, the absence of a reference to related literature cannot necessarily be construed to mean that teams omitted this process. Rather, it might simply be a conscious choice of the team not to document this step. Given that educators are often criticized for dismissing the value of professional literature, however, it is just as likely that this all-important step may have been omitted.

Although the teams were able to identify a problem area for study, most problem statements were written in broad, generalized descriptions and only four teams included actual research questions in their problem statement C even though the samples provided in the training materials clearly identified the need for research questions. While the lack of clearly identified research objectives could be an indication that the teams were still in the process of delimiting their problem area, it is more likely that the teams lacked the skills and practice to focus their target area—a task that is challenging to even experienced researchers. The need to identify specific questions, however, is a critical initial step in the action research process because it is the questions themselves that will drive the data collection and analysis steps.

Sources of Data. The second component of the plans was sources of data, and 13 of the teams addressed this topic. The four teams that listed specific research questions were able to identify data that were congruent with their questions. For example, the number of office referrals and interview data were suggested data sources as indicators of improved safety. Writing samples, test scores, and teacher observations were identified as indicators of written expression. Nine teams did not identify specific research questions, and they took one of two approaches to this section. Six of these teams identified the data sources (e.g., staff, student, and parent questionnaires, archival data, and interviews, etc.) that they used to identify and clarify their problem focus. The remaining three teams conjectured about the sources of data that they *might* use as they implemented their plans.

Several issues bear noting. First, teams did seem to understand that the value of multiple measures. Of particular concern however, is the obvious misuse of survey methods. Twelve teams proposed or actually sent questionnaires to parents. Judging by the number of responses reported, it is clear that there was no consideration given to the necessary sample size, the representativeness of the sample, and the biased responses.

Data Analysis. The five teams that collected data to clarify their problem statements were actually in a position

to analyze data. Indeed, three of these teams reported actual results (in the form of frequency counts and narrative analysis) and the other two teams simply stated that they analyzed the results. The remaining teams could only conjecture about how they *might* analyze the data, and they did so in very vague and broad terms.

Action Plan. The last component of the documents was an action plan. The purpose of this part was to identify the steps that teams expect to initiate. Although ten teams *addressed* the topic of an action plan, only three of the teams actually identified a list of specific steps that they plan to undertake, and only one of the teams actually considered such topics as resources, participants, and a time-line for completing the tasks. The remaining seven plans included a very vague and often flowery narrative about future actions.

In summary, the variability in the plans may be due to several factors. First, given the nature of the training materials, it may be that the *technical* skills of action research were not sufficiently addressed. The need for choice and independence in developing their plans notwithstanding, beginning researchers are likely to benefit from structured guidelines or perhaps even a template to guide their efforts. Certainly, the technical skills of action research must be addressed. To the trained researcher, the ASCD materials may make sense. But the process of systematic inquiry needs more depth. It is difficult to adapt *formal* research methods (i.e., survey sampling, questionnaire design, etc.) for use in action research endeavors if one doesn't know the fundamentals. Second, it was obvious through the interview and focus group data that teams were at varying stages. Some teams were cohesive units. Other teams appeared to struggle through the process. Clearly the need to communicate among themselves was prerequisite to any systematic problem solving.

Conclusion

In summary, our discussion results in two arguments. The first centers on the need for technical skills to be developed in all members of the school improvement team for progress to be made toward an action research agenda. Second, it is important to note that the members of these teams felt strongly empowered and efficacious toward their ability to work together on shared common school improvement goals. Even without a complete battery of technical skills, teachers can achieve strong affective results by simply participating in a program focused on school improvement goals.

Time is not only necessary to carry out change agendas but essential if innovations like action research are to be maintained. Schools cannot remain both static and exceptional. An institutionalized ongoing self-renewal process is necessary for the maintenance of school effectiveness, and this, in turn, implies a need for considerable and regular blocks of time devoted to technical skill-based learning and the creation of school improvement knowledge. Teachers need opportunities to consider action research plans and data

within department or grade level gatherings and in the context of all-school efforts. Consequently, the use of time devoted to action research must be understood in two ways. First, teachers must be provided the means to meet on a daily basis to address issues of concern to immediate work groups of faculty—departments, grade levels or teams. Second, provision must be made for cross connection among smaller work groups that emerge in the full faculty. It is only when school efforts are clearly described and focused upon that improvement based on action research projects will occur.

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General Information

The 2000 MWERA Annual Meeting will be held **Wednesday, October 25 through Saturday, October 28**, at the Holiday Inn Mart Plaza in Chicago, Illinois. The program will consist primarily of presentations, selected through a peer review process, by divisional program chairpersons. In addition, there will be invited speakers and symposia, panel discussions, special sessions for graduate students and new faculty, a luncheon and other social events open to all attendees.

Proposals may be submitted either on paper or electronically over the World Wide Web. All proposals submitted on paper must be sent to just one Division. The Division Chairs' addresses are noted below. Proposals must follow the *Guidelines for Submitting a Proposal* in this booklet. Questions about a proposal or the meeting, whether submitted on paper or electronically, should also be directed to the Program Chair:

Dr. Carmen R. Giebelhaus
MWERA-2000 Program Chair
300 College Park
University of Dayton
Dayton, OH 45469-0525
Office: (937) 229-4511
e-mail: drgieb@aol.com

Electronic proposals must be submitted using the form available on the meeting Web site. Proposals e-mailed to the Division Chairs or Program Chair will not be processed. Further, each proposal should only be submitted once in one format, electronic or paper. Specific instructions for electronic submission can be found at the meeting web site:

<http://tierlab.ilstu.edu/MWERA>

Any educational professional may submit a proposal for MWERA-2000, whether or not that person is currently a member of MWERA. *All Annual Meeting presenters must be members in good standing of MWERA (non-members must join MWERA upon notification of proposal acceptance).* To promote broader participation in the program no one person should appear as a presenter on more than three proposals.

All proposals, regardless of submission format (electronic or paper), must be received by the designated Division Chair no later than the deadline of **May 1, 2000**. Each Division Chair will coordinate a number of volunteers in a system of blind (without author identification) review. Appropriate criteria, depending on the format and type of scholarly work being presented, have been developed and are used for the review process. These criteria include: (a) topic (originality, choice of problem, importance of issues); (b)

relevance of topic to the Division and MWERA membership; (c) contribution to research and education; (d) framework (theoretical/conceptual/practical, rationale, literature review, grounding); (e) analyses and interpretations (significance, implications, relationship of conclusions to findings, generalizability or usefulness); and (f) overall written proposal quality (clarity of writing, logic, and organization).

Papers presented at MWERA are expected to present original scholarship, conducted by the author(s), which has not been previously presented at any other meeting or published in any journal. Further, it is a violation of MWERA policy to promote commercially available products or services (except as Exhibits) which go beyond the limits of appropriate scholarly/scientific communication. Individuals who wish to display educationally related products or services are encouraged to contact Dr. Sharon McNeely, Assistant Program Chair for Exhibits, P. O. Box 34421, Chicago, Illinois 60634, (913) 794-2788.

All persons presenting at the 2000 Annual Meeting are expected to register for the full meeting. All sessions listed in the program will be open to any registered meeting participant; however, enrollment may be limited, and a small additional fee required, for some Workshop sessions. Tickets for the Friday luncheon and speaker are available to all pre-registrants. *Ticket availability is not guaranteed for late and on-site registrants.* Registration materials for the 2000 Annual Meeting will be published in the *Mid-Western Educational Researcher*, on the Web site, and can be obtained by contacting the Program Chair.

Presenters whose papers have been accepted to a session with a Session Chair and/or Session Discussant are responsible for submitting a completed version of their conference paper to the Session Chair and Discussant no later than September 20, 2000. *Papers not available to the Session Chair and Session Discussant may be dropped from the program.* Presenters must also provide complete copies of their papers (or detailed handouts) to attendees at their sessions. Overhead projectors and screens will be provided by MWERA in most presentation rooms. Presenters needing additional A/V equipment are responsible for arranging such with the hotel at the presenter's own additional expense.

MWERA reserves the right to reproduce and distribute summaries and abstracts of all accepted proposals, including making such works available in a printed Program Abstract, through the meeting's World Wide Web site, and in press releases promoting the Annual Meeting and the organization. *As a condition of acceptance all authors of papers accepted to the 2000 Annual Meeting explicitly grant MWERA*

the right to reproduce their work's summary and/or abstract in these ways. Such limited distribution does not preclude any subsequent publication of the work by the author(s).

Authors of accepted proposals assume the ethical and professional responsibility to appear at the Annual Meeting and to participate in their presentation or assigned session. When circumstances preclude the author(s) from doing so, it is the responsibility of the author to arrange a suitable substitute and to notify the Program Chair in advance.

Divisions

A - Administration and Leadership

This division is concerned with research, theory, development, and the improvement of practice in the organization and administration of education. Paper proposals should be mailed to the Sr. Chair of Division A: **Micheal Supley, P.O. Box 610, Kingsville, TX 78364**

B - Curriculum Studies

This division is concerned with curriculum and instructional practice, theory, and research. Paper proposals should be mailed to the Sr. Chair of Division B: **Nancy G. Saunders, 4301 W. Riverside, Muncie, ID 47304**

C - Learning and Instruction

This division is concerned with theory and research on human abilities, learning styles, individual differences, problem solving, and other cognitive factors. Paper proposals should be mailed to the Sr. Chair of Division C: **Cindy Campbell Dept. of Technology, Research, & Assessment, Northern Illinois University, DeKalb, IL 60115**

D - Measurement and Research Methodology

This division is concerned with measurement, statistical methods, and research design applied to educational research. Paper proposals should be mailed to the Sr. Chair of Division D: **Janet Sheehan-Holt, Dept. of Technology, Research, & Assessment, Northern Illinois University, DeKalb, IL 60115**

E - Counseling and Development

This division is concerned with the understanding of human development, special education, and the application and improvement of counseling theories, techniques, and training strategies. Paper proposals should be mailed to the Sr. Chair of Division E: **Linda Bakken, Wichita State University, ACES, Box 123, Wichita, KS 67260**

F - History and Philosophy

This division is concerned with the findings and methodologies of historical research in education. Paper proposals should be mailed to the Sr. Chair of Division F: **Louise Fleming, 313 Bixler Hall, Ashland University, Ashland, OH 44805**

G - Social Context of Education

This division is concerned with theory, practice, and research on social, moral, affective, and motivational characteristics and development, especially multi cultural perspectives. Paper proposals should be mailed to the Sr. Chair of Division G: **Anne Stinson, UWW – Division of Curriculum and Instruction, 800 Main Street. Whitewater, WI 53190**

H - School Evaluation and Program Development

This division is concerned with research and evaluation to improve school practice, including program planning and implementation. Paper proposals should be mailed to the Sr. Chair of Division H: **Isador Newman, University of Akron, College of Education, Akron, OH 44325-4208**

I - Education in the Professions

This division is concerned with educational practice, research, and evaluation in the professions (e.g., medicine, nursing, public health, business, law, and engineering). Paper proposals should be mailed to the Sr. Chair of Division I: **Joyce Miller, Chemistry Dept., Mt. Vernon Nazarene College, 800 Martinsburg Rd., Mt. Vernon, OH 43050**

J - Postsecondary Education

This division is concerned with a broad range of issues related to two-year, four-year, and graduate education. Paper proposals should be mailed to the Sr. Chair of Division J: **Rodney Greer, Horribin Hall, 1 University Circle, Macomb, IL 61455**

K - Teaching and Teacher Education

This division is concerned with theory, practice, and research related to teaching at all levels and in-service and pre-service teacher education, including field experience supervision and mentoring. Paper proposals should be mailed to the Sr. Chair of Division K: **Jim Salzman, 2570 East Wallings Road, Broadview Heights, OH 44147**

Important Dates

Proposal Submission Deadline	May 1, 2000
Notification of Acceptance	July 15, 2000
Papers to Session Chairs/Discussants	September 20, 2000
Meeting Registration and Hotel Reservations	September 15, 2000
MWERA 2000 Annual Meeting	October 25-28, 2000

Guidelines for Submitting a Proposal

Session Format Descriptions

Paper Presentation

Paper sessions are intended to allow presenters the opportunity to make short, relatively formal presentations in which they overview their papers to an audience. Three to five individual papers dealing with related topics are grouped into a single session running from 1.5 to 2 hours. The presenter(s) of each paper is(are) allowed approximately 15 minutes to present the highlights of the paper. A single Session Discussant is allowed approximately 15 minutes, following all papers, for comments and critical review. A Session Chair moderates the entire session. Presenters are expected to provide complete copies of their papers to all interested audience members.

Roundtable Discussion/Poster

Roundtable Discussion/Poster sessions are intended to provide opportunities for interested individuals to participate in a dialogue with other interested individuals and the presenter(s) of the paper. Presenters are provided a small table around which interested individuals can meet to discuss the paper. Presenters may elect to provide small, table-top poster-type displays, ancillary handouts, or other table-top A/V materials to augment their discussions. Interested individuals are free to move into and out of these discussions/posters as they wish. Presenters are expected to make available complete copies of the paper on which the roundtable discussion/poster was focused.

Symposium

A symposium is intended to provide an opportunity for examination of specific problems or topics from a variety of perspectives. Symposium organizers are expected to identify the topic or issue, identify and ensure the participation of individual speakers who will participate in the session, prepare any necessary materials for the symposium, and Chair the session. It is suggested, though not required, that the speakers or symposium organizer will provide interested individuals with one (or more) papers relevant to, reflective of, or drawn from the symposium.

Workshop

Workshops are intended to provide an extended period of time during which the workshop leader helps participants develop or improve their ability to perform some process (e.g. how to provide clinical supervision, using the latest features of the Internet, or conduct an advanced sta-

tistical analysis). Organizers may request from 1.5 to 3 hours, and are responsible for providing all necessary materials for participants. Many workshops are scheduled for Wednesday afternoon, although others may be scheduled throughout the conference. Organizers may, if they wish, receive an honorarium based upon the number of paid participants in their workshop and the fee schedule.

Alternative Session

The form, topics, and format of alternative sessions are limited only by the imagination and creativity of the organizer. These options are intended to afford the most effective method or approach to disseminating scholarly work of a variety of types. Proposals for alternative sessions will be evaluated on their appropriateness to the topic and audience, their suitability to meet the limitations of time, space, and expense for MWERA, and the basic quality or value of the topic. The organization of alternative sessions is responsible for all major participants or speakers, developing and providing any necessary materials, and conducting or mediating the session. Because a variety of approaches may be proposed within this category, alternative session proposals should include a brief rationale for the alternative being proposed.

Best Practices Forum

The "Best Practices" sessions are intended to provide opportunities for individuals or groups to present "best" or "promising" practices impacting both K-12 and higher education. Highlighting unique and innovative programs that have demonstrated promise for improving and enhancing educational practice. Presenters will be grouped by similar topics to facilitate discussion between and among the groups and audience. Presenters are expected to make available complete copies of the paper on which the "Best Practices" session focused.

Materials to be Submitted

The following materials list applies to proposals submitted on paper. Separate guidelines exist for electronically submitted proposals (see the Web site for details).

Proposal Cover Sheet

Six (6) copies typewritten with all items completed. Session descriptors must be chosen from the list of descriptors provided (see table to the right).

Summary

Six (6) copies of a two to three page summary for use in judging the merits of the proposal. Summaries can be single-spaced, but must be typed on 8.5" x 11" paper in no smaller than 10-point type using 1" margins. All copies of the summary should include the title of the proposed session in the upper left-hand corner of the first page. On three of the summaries **only** include the name of the presenter, with his or her complete mailing address, telephone and FAX, and e-mail, in the upper right hand corner of the first page. Proposals, which do not meet these criteria, may be refused by the Program Chair without review.

Summaries for **Paper** and **Roundtable Discussion/Poster** proposals should explicitly address as many of the following as appropriate, preferably in this order: (1) Objectives, goals, or purposes; (2) Perspective(s) and/or theoretical framework; (3) Methods and/or techniques (data source, instruments, procedures); (4) Results and conclusions; and (5) Educational and/or scientific importance of the work.

Summaries for **Symposium, Workshop, and Alternative Session and Best Practices Forum** proposals should explicitly address as many of the following as appropriate, preferably in this order: [1] Descriptive title of the session; [2] Objective, goals and purposes of the session; [3] Importance of the topic, issue, or problem; [4] Explanation of the basic format or structure of the session; [5] Listing of the Presenter and Co-Presenter(s), with an explanation of each person's relevant background and role in the session; [6] Anticipated audience and kind of audience involvement.

Abstract

Three (3) copies of a 100 - 150 word narrative abstract. The abstracts of accepted papers will be published the *MWERA 2000 Annual Meeting Abstracts* book, and will be available on the World Wide Web site. Abstracts must be type-written, single-spaced, using a 12 point Arial or Times Roman font. Use clear, precise language, which can be understood by readers outside your discipline. In the upper left hand corner of each abstract page type the title of the paper, and the name and institutional affiliations of each author.

Envelopes

Four (4) stamped, self-addressed, business size (#10) envelopes. These will be used to inform you of: (a) receipt of the proposal by the Program Chair; (b) the decision about your paper's acceptance; (c) your scheduled session time, Session Chair, and Session Discussant, and; (d) meeting registration and hotel reservation information.

Session Descriptors

Ability Grouping	Educational Policy	Performance Assessment
Accountability	Educational Reform	Philosophy
Accreditation	Elementary Schools	Physical Education
Achievement	Equating	Planning
Action Research	Equity	Politics
Adaptive Testing	Ethics	Postsecondary Education
Administration	Ethnicity	Principals
Admissions	Evaluation	Private Education
Adolescence	Experimental Design	Problem Solving
Adult Education/Development	Facilities	Professional Development
Affective Education	Factor Analysis	Program Evaluation
Aging	Faculty Development	Psychometrics
Anthropology	Family/Home Education	Qualitative Research
Aptitude	Finance	Race
Artificial Intelligence	Gay/Lesbian Studies	Reading
Arts Education	Gender Studies	Research Methodology
Asian Education	Generalizability Theory	Research Utilization
Assessment	Gifted Education	Restructuring
At-Risk Students	Governance	Retention
Attitude	High Schools	Rural Education
Attribution	Hispanic Education	School/Teacher Effectiveness
Bilingual/Bicultural	History	Science Education
Black Education	Indian Education	Self-Concept
Business Education	Indicators/Information Systems	Social Class
Career Development	Individual Differences	Social Context
Case Studies	Information Processing	Social Processes/Development
Certification/Licensure	Instructional Design/Development	Social Studies Education
Child Development	Instructional Practices	Sociology
Classroom Management	Instructional Technology	Special Education
Classroom Research	Intelligence	Staff Development
Clinical Education	International Education/Studies	Standard Setting
Cognition	Item Response Theory (IRT)	Statistics
Cognitive Processes/Development	Language Comprehension/Development	Stress/Coping
Collaboration	Language Processes	Structural Modeling
Community Colleges	Law/Legal	Student Behavior/Attitude
Comparative Education	Leadership	Student Cognition
Compensatory Education	Learning Environments	Student Knowledge
Comprehension	Learning Processes/Strategies	Student Teaching
Computer Applications	Life-Span Development	Studying
Computerized Testing	Literacy	Supervision
Computers and Learning	Literature	Survey Research
Conceptual Change	Mainstreaming	Teacher Assessment
Constructivism	Mathematics Education	Teacher Characteristics
Continuing Education	Measurement	Teacher Cognition
Cooperative Learning	Media	Teacher Education/Development
Counseling	Medical Education	Teacher Knowledge
Counselor Training/Supervision	Memory	Teacher Research
Critical Theory	Mentoring	Teaching Context
Critical Thinking	Meta-Analysis	Technology
Cross-Cultural Studies	Metacognition	Testing
Curriculum	Middle Schools	Test Theory/Development
Data Analysis	Military Education	Textbooks
Decision Making	Minorities	Tutoring
Demography	Moral Education/Development	Urban Education
Desegregation	Motivation	Validity/Reliability
Differential Item Functioning	Museum Education	Vocabulary
Dimensionality	NAEP	Vocational Education
Dropouts	Networking	Women's Issues
Early Childhood	Organization Theory/Change	Work
Economics of Education	Peer Interaction/Friendship	Writing

Reading Ability as a Predictor of Student Success in Business School

Robert E. Pritchard and George C. Romeo
Rowan University

Abstract

For several years accounting faculty at a regional university observed that some of their students exhibited difficulty reading. This study of 235 sophomore, junior, and senior business majors enrolled in accounting classes examines the relationship between their reading abilities as measured by the Nelson-Denny Reading Test and their cumulative grade point averages (GPAs). The results indicate that students who have higher levels of reading comprehension and reading vocabulary have higher cumulative GPAs. Furthermore, the results indicate that about 16 percent of the students tested could not read at the first-year college level. This paper describes the testing and recommends that students' reading abilities be factored into the admission processes.

Several studies (discussed and cited below) have shown that the ability to learn depends to a large degree on the ability to read. Usually, students who demonstrate superior reading comprehension and have larger reading vocabularies, obtain better grades. This paper represents a continuation and extension of the existing research to the study of business administration. The paper describes the results of measuring the reading abilities of 235 business students at a regional university and relates the results to the students' cumulative GPAs.

Considerable research relates reading skills to student performance. Wood (1982) reported positive correlations between the Nelson-Denny Reading Test scores for over 1,000 college freshmen and their course grades in general psychology, general sociology, introductory speech and general English writing. Wood (1988) found that "College grades appear to be best predicted by previous grades, either in high school or college ($r = .3$ to $.6$). The next best predictors of college grades tend to be scores on reading tests or general aptitude tests ($r = .2$ to $.4$) such as the Nelson-Denny Reading Test and the tests of the American College Testing Program (ACT) and Scholastic Aptitude Testing Program (SAT)" (p. 2). Wood continues, "Nelson-Denny Test scores and scores from ACT and SAT tests do function as reading tests and do predict the kind of college success that is measured by college grades" (p. 5).

Kessler and Pezzetti (1990) studied the impact of reading ability on exam performance in six psychology classes. They report, "While the results varied for each instructor, reading ability was shown to be significantly related to test performance. On the average, the high reading group out-performed the low group by 7 to 12 percentage points on each major exam. While test scores improved over the semester for both groups, the low readers never bridged this performance gap. As students drop over the course of the year (for a myriad of reasons), the number of poor readers declines at a greater rate than those with better skills" (p. 1).

Similarly, Iadevaia (1989) reported the results of using a Pearson correlation coefficient calculation in a study of 558 students conducted between 1983 and 1988. He found a correlation of ($r = .32539$) between grades in an algebra-based physics course and the Nelson-Denny Reading Test results. He notes, "A possible conclusion was that the Nelson-Denny Reading score was the best predictor of a student's completion of PHY 121 with a passing grade" (p. 17). Iadevaia's results may be particularly interesting to business faculty trying to predict student success in quantitative business courses such as finance that depend heavily on the use of algebra.

Brown, et al. (1993) note, "The ability to read well is so important in our culture that it is often the principal cause of success or failure from the first grade of elementary school through college and into professional life" (p. 1). They continue, "The University of Minnesota collected data over a five-year period. Test scores were collected for three groups—those graduating with high distinction, those with distinction, and those on probation. As incoming freshmen, those graduating later with high distinction averaged at the 83rd percentile on the Nelson-Denny test, those with distinction at the 68th percentile, and those on probation at the 42nd percentile" (p. 8).

Existing research indicates that reading ability is important to academic achievement. Students who demonstrate superior reading skills appear to have a learning advantage.

Research Design

During the end of the spring 1997 semester, a study was conducted to measure the reading ability of business students. The study included 235 participants, 131 females and 104 males, enrolled in day and evening classes. There were 100 sophomores, 86 juniors and 49 seniors. Students were tested using the Nelson-Denny Reading Test that measures reading comprehension, reading vocabulary, and reading

rate. The testing was conducted during regularly scheduled class periods by university faculty.

The Nelson-Denny Reading Test was chosen as the measurement tool primarily because of its demonstrated usefulness in predicting academic success. In addition, it was chosen because of its wide acceptability over many years of use, its recent standardization on relevant populations (high school students and students from two-year and four-year colleges), and its minimization of gender and ethnic bias. In addition, the three stratifying variables (region, district enrollment, and socioeconomic status) were utilized in selecting participants in the standardization trials (Brown et al., 1993).

Research Analysis

The students' scores using the Nelson-Denny Reading Test were analyzed using Chi-square, Pearson correlation coefficients and linear regression. Chi-square was used to test goodness of fit. The Pearson correlation coefficients were used to measure the strength of linear relationships. Linear regression was used to study the relationships among the variables as well as to summarize the data.

For Chi-square analysis, student scores on the reading comprehension, vocabulary, reading rate, and calculated reading grade equivalent (comprehension plus vocabulary) were divided into quintiles. The students' cumulative GPAs were also divided into quintiles. Then, the cumulative GPAs were compared with outcomes in each of the reading-measure quintiles. Continuous data were analyzed using the Pearson correlation coefficients and linear regression analysis. Relationships were considered to be statistically significant at the .05 level.

Research Results

The research indicates statistically significant relationships between the dependent variable (students' cumulative GPAs) and the following three explanatory variables: 1) reading comprehension, 2) reading vocabulary and 3) calculated reading grade equivalent. However, a statistically significant relationship did not exist between students' reading rates and their cumulative GPAs.

The descriptive statistics underlying the calculated reading grade equivalents for the 235 students who were tested are included in Table 1. The Pearson correlation coefficients are shown in Table 2. The regression analysis results are shown in Table 3. The relationships between the four explanatory variables (students' reading comprehension, reading vocabulary, calculated reading grade equivalents, and reading rate) and their cumulative GPAs are shown in Tables 4 through 7 respectively.

As shown in Table 1, the students' scores indicate a fairly wide dispersion of calculated reading grade equivalents, ranging from a low of 4.1 to a high of 18.9 (the highest reading grade equivalent using the Nelson-Denny Reading Test), with a standard deviation of 3.32. Interest-

Table 1
Students' Calculated Reading Grade Equivalents

Descriptive statistics	
Descriptive statistic	Calculated read grd. equiv.
Minimum	4.1
Maximum	18.9
Range	14.8
Mean	14.92
Standard Deviation	3.32
Median	15.6
Mode	16.3
Percentile	Calculated read grd. equiv.
25th	13.8
50th	15.6
75th	17.3

Table 2
Correlations Between Students' Cumulative GPAs and Vocabulary, Reading Comprehension, Reading Rate, and Calculated Reading Grade Equivalents

Pearson correlation coefficients and probabilities					
	Voc.	Compre.	Rate	Rd. Gd. Eq.	Cum.GPA
Voc.	-	r=.7228 p=.000	r=.3350 p=.000	r=.9434 p=.000	r=.2878 p=.000
Compre.		-	r=.3182 p=.000	r=.8810 p=.000	r=.2680 p=.000
Rate			-	r=.3741 p=.000	r=.0871 p=.218
Rd. gd. eq.				--	r=.3076 p=.000
Cum. GPA					-

Note: Table heading abbreviations: Voc. = Vocabulary, Compre. = Comprehension, Rd. gd. eq. = Reading grade equivalent, Cum. GPA = Cumulative GPA.

Table 3
Cross-sectional Regression Results with Student Cumulative GPAs as Dependent Variable and Reading Vocabulary, Reading Comprehension, and Calculated Reading Rate Test Scores as Independent Variables

GPA =	b ₀	+ b ₁ Vocab.	+ b ₂ Comp.	+ b ₃ Rate
Bvalue	2.430	.007	.005	9.537e-.05
t-ratio	14.363	2.204	1.464	-.208
Prob.	.0000*	.0285*	.1445	.8351

* Significant at the .05 level

R ²	F-Value	Prob.
.09150	7.55389	.0001

ingly, 11 students (nearly five percent) had calculated reading grade equivalents of 18.9 (the highest obtainable calculated reading grade equivalent). Approximately 16 percent of the students in the study (38 students) had calculated reading grade equivalents below the thirteenth grade level.

The relationship between the students' reading comprehension scores and their cumulative GPAs was statistically significant at the .05 level using Chi-square ($P > .00054$) as well as when using Pearson correlation coefficients, ($r = .2680$).

The relationship between the students' reading vocabulary test scores and their cumulative GPAs was statistically significant at the .05 level using Chi-square ($P > .00037$) as well as when using Pearson correlation coefficients, ($r = .2878$). The regression analysis (Table 3) indicates that reading vocabulary is the most important factor affecting cumulative GPAs.

As noted above, calculated reading grade equivalent represents a combined measure of reading comprehension and reading vocabulary. Since the students' cumulative GPAs were very highly correlated with their reading comprehension and reading vocabulary scores, it is not surprising that their cumulative GPAs are also highly correlated with their calculated reading grade equivalents at the .05 level using Chi-square ($P > .00000$) as well as when using Pearson correlation coefficients, ($r = .3076$). Clearly, those students who demonstrate superior reading comprehension and have larger reading vocabularies have higher cumulative GPAs.

The relationship between the students' reading rate scores and their cumulative GPAs was not statistically significant at the .05 level using Chi-square ($P > .54073$). Nor was it significant when using Pearson correlation coefficients. The data are presented in Table 7.

Conclusions And Recommendations

The study results clearly indicate statistically significant relationships between students' reading comprehension and reading vocabulary scores on the Nelson-Denny Reading Test and their cumulative GPAs. Students who have higher levels of reading comprehension and larger reading vocabularies generally have higher cumulative GPAs. Fur-

thermore, students' cumulative GPAs were highly correlated with their calculated reading grade equivalents at the .05 level with $P > .00000$. However, although the relationship between reading ability and students' GPAs is statistically significant as shown in Table 3, reading ability only explains about nine percent of the variation in students' GPAs. Obviously, there are other factors that affect student performance. As noted earlier, Wood (1988) indicated that college students' grades are best predicted by previous high school and college grades.

The students' reading rate scores were not statistically significant predictors of their cumulative GPAs. This is not surprising since understanding highly technical materials may take considerable time, including, for example, performing the calculations associated with accounting or finance textbook examples. Materials written for different purposes should be read at different rates. Thirty-nine percent of the students with reading rates in the two lowest quintiles had cumulative GPAs in the highest quintile. Reading comprehension and vocabulary are the clear predictors of students' cumulative GPAs, not reading rate.

Many colleges already test entry-level freshmen for reading skills. Weiner and Bazerman (1995) report that when information about student reading level is sought, it is commonly taken from basic skills reading tests required by the state for entering college freshmen. Examples of these include the Texas Academic Skills Program, the Georgia Collegiate Placement Examination, and the Florida College Level Academic Skills Test. These tests are screening devices used to place students in regular or remedial tracks. Unfortunately, the existing admissions testing processes (and

Table 4
Students' Cumulative GPAs and Reading Comprehension Test Scores

Reading comprehension test scores (quintiles)						
		Lowest			Highest	
GPAs	(quin.)	1	2	3	4	5
Lowest	1	24.4%	48.6%	18.5%	10.0%	2.9%
	2	31.1%	8.6%	22.2%	15.0%	22.9%
	3	24.4%	14.3%	16.7%	21.7%	22.9%
	4	8.9%	17.1%	22.2%	26.7%	22.9%
Highest	5	11.1%	11.4%	20.4%	26.7%	28.6%

Note: Table heading abbreviation: quin. = quintiles.

Table 5
Students' Cumulative GPAs and Reading Vocabulary Test Scores

Reading vocabulary test scores (quintiles)						
		Lowest			Highest	
GPAs	(quin.)	1	2	3	4	5
Lowest	1	28.3%	34.9%	17.6%	15.2%	2.3%
	2	26.1%	20.9%	11.8%	21.7%	20.9%
	3	26.1%	27.9%	17.6%	17.4%	11.6%
	4	10.9%	7.0%	29.4%	23.9%	27.9%
Highest	5	8.7%	9.3%	23.5%	21.7%	37.2%

Note: Table heading abbreviation: quin. = quintiles.

Table 6
Students' Cumulative GPAs and Calculated Reading Grade Equivalents

Calculated reading grade equivalents (quintiles)						
		Lowest			Highest	
GPAs	(quin.)	1	2	3	4	5
Lowest	1	24.4%	47.7%	11.3%	10.8%	6.0%
	2	31.1%	20.5%	15.1%	10.8%	22.0%
	3	26.7%	11.4%	24.5%	27.0%	12.0%
	4	8.9%	9.1%	24.5%	29.7%	28.0%
Highest	5	8.9%	11.4%	24.5%	21.6%	32.0%

Note: Table heading abbreviation: quin. = quintiles.

Table 7
Students' Cumulative GPAs and Reading Rates

Reading rates (quintiles)						
		Lowest			Highest	
GPAs	(quin.)	1	2	3	4	5
Lowest	1	23.4%	24.1%	16.1%	15.4%	17.8%
	2	23.4%	14.8%	25.8%	25.0%	13.3%
	3	21.3%	22.2%	12.9%	21.2%	20.0%
	4	17.0%	14.8%	35.5%	15.4%	24.4%
Highest	5	14.9%	24.1%	9.7%	23.1%	24.4%

Note: Table heading abbreviation: quin. = quintiles.

remediation programs) do not assure that all students can read at the college level.

One reason for this problem may be that the basic skills reading tests are typically not power tests that show deeper levels of vocabulary and inferential reading ability. Unlike many basic skills reading tests, the Nelson-Denny Test scores, for example, indicate those students who need further reading vocabulary development as well as those who have difficulties with reading comprehension. Consequently, the use of a test like the Nelson-Denny Reading Test as a part of a business admissions process could both identify more accurately those students who are poor readers as well as substitute for basic skills reading tests.

The high degree of correlation between reading grade equivalents as an explanatory variable and students' cumulative GPAs, as well as the very broad range of student calculated reading grade equivalents (4.1 to 18.9), further suggests that students' reading grade equivalents be measured as a part of an additional screening process for admitting students to business programs (and perhaps other programs as well). Students who cannot read at the thirteenth grade level (or some other minimum level) could be required, for example, to take remedial courses in reading and/or accepted for admission on a probationary basis.

In summary, the data point to the critical importance of students having good reading skills if they are to succeed in business programs. Furthermore, this study shows that basic skills screening does not identify or eliminate all marginal or needy students. Consequently, some students with weak reading skills are admitted to business programs. An important issue is how to assure they receive the help they need to succeed.

Brozo (1990) notes that reading is an interactive process. "This means that a student's ability to comprehend is not fixed or constant; rather, comprehension will vary across texts, tasks and settings (prior knowledge and interest are two powerful factors that contribute to variability on reading tasks)" (p. 523). Brozo further states, "The goal of interactive (reading) assessment, therefore, is to discover the conditions under which a student will succeed in reading, rather than merely describing a student's current status as a reader" (p. 523). "The goal of assessment is not the identification of a disability but rather the specification of the conditions under which a particular student will learn" (p. 527).

Brozo (1990) notes, "Many poor secondary readers bring to the classroom a long history of failure and, likely, a repertoire of strategies designed to avoid reading, so solutions are not simple" (p. 327). The article includes a series of five strategies that can be employed to improve students' reading and learning that may be applicable at the college level as well as at the secondary level.

Finally, it is important to note that there are differences in the performance on reading tests among African-Americans, Latino, and Native American students, as well as students for whom English is a second language. The critical factors underlying these differences are poverty and English proficiency (Garcia and Pearson, 1992). They note, "Differences between Anglo students and students of color are substantially reduced when comparisons are limited to students from the same income levels and similar proficiency in standard English" (p. 340). The development and implementation of policies to measure business students' reading ability and to provide programs to assist them need to consider these differences.

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Culture and Strategy in Business Schools: Links to Organizational Effectiveness

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Abstract

The purpose of this study is to examine the independent and conditional effects of organizational culture type and managerial strategy on the organizational effectiveness of higher education schools of business. While significant differences are found for both culture type and managerial strategy on the effectiveness measures, there were no significant interactive effects between the two independent variables. The implications of these findings for efforts to enhance the effectiveness of professional and pre-professional collegiate programs are discussed.

In the last two decades major structural changes in the larger world environment have required substantial effort on the part of all organizations to survive, remain viable, and demonstrate their strategic effectiveness in the face of increasing uncertainty and public scrutiny. Vast external environmental changes in technology, demographics and economic structures have been juxtaposed with the increasingly tenuous nature of available resources necessary for successful professional education (Axinn and Thach, 1996). The overall effectiveness of one professional program versus another is heatedly debated in published rankings, graduate salaries and job offers with attendant disputes over academic accreditation. Part of the problem with measuring the effectiveness of professional programs is their dual role as academic and professional institutions serving two different constituencies, one academic and the other in practice. Service to the academic discipline (e.g., rigor in theory and scholarship) competes with service to practice (e.g., applied problems and operations) (Cheit, 1985). As new societal demands are placed upon professional programs, it becomes imperative that systematic analysis is extended not simply to the larger higher education institution in which the professional program resides but to the professional program itself.

Establishing measurements of effectiveness for professional programs in general is of little use as a "diagnosis" for determining effectiveness in individual institutions without an understanding of why the school exists in such a state. Two central concepts thought to be necessary to an understanding of organizational effectiveness are a) that Management must make strategic choices that are fundamental in the determination of organization design and serve to define the organization's relationship with the broader environment (Child, 1972) and b) that organizational actions are guided and determined by the internal organizational culture that relates to the specific behaviors regarding decision making and acceptance (Katz and Kahn, 1978). This paper examines the

relationship of organizational culture and managerial strategy to each other and to organizational effectiveness.

Outcome Variables

Organizational Effectiveness. Researchers have developed a number of multidimensional measures of effectiveness to describe the process by which decision makers determine the overall performance of the organization to its external and internal environments (Cameron, 1978; Peters and Waterman, 1982; Quinn and Rohrbaugh, 1983). Virtually all studies and theories about organizations are in some way based on the construct of effectiveness despite the confusion surrounding its meaning. Cameron's (1978) construct of organizational effectiveness is a theoretical framework that incorporates the use of multiple perspectives that can be recorded in relationship to one another and is the perspective used in this study.

Organizational Culture. Organizational culture has been found to be a central concept in previous research studies seeking to understand and improve organizational development (Denison and Spreitzer, 1991, Ouchi 1981; Deal and Kennedy 1982; Peters and Waterman 1982; Schein 1985, 1990). Pettigrew (1979) defines organizational culture as the "amalgam of beliefs, ideology, language, ritual and myth" (1979:571) influencing internal organizational constituencies. Without an understanding and comprehension of the effects of organizational culture a true measure of organizational performance is not possible (Wilkins and Ouchi 1983). Schein (1985) suggested that culture contributes to external adaptation of the organization through providing a consensus about mission, strategy and goals and to internal integration issues through consensus of language, conceptual categories and group boundaries, influence and power. In essence, culture shapes action by defining what people want (Parsons, 1951; Swidler, 1986).

Many definitions of culture have been offered to explain its meaning in organizations. Cameron and Ettington

(1989) found at least 17 definitions to suggest the variety and lack of consensus on meaning. Research by Ouchi (1980, 1981, 1983) suggested three types of organizational cultures grounded in transaction cost theory 1) Clans—Socialization of all organizational members to a common goal with a close interchange between work and social life. 2) Markets—Measuring contributions of organizational members to the common good with compensation based upon contribution and competitive bidding for services and 3) Hierarchies—Contractual specifications of rights and duties to organizational members but with a lack of a clear sense of the value of their services. Ouchi argued that Market cultures succeed when numerous buyers and sellers succeed in maximizing their value through specific short term contractual relationships e.g., performance of a specific project usually in a given period of time. Market cultures fail under complex and large transactions and where the determination of value contributed by an individual worker is ambiguous in the making of the final product. Hierarchies (bureaucracies) work well when long-term relationships, division of specialized labor and monitoring of employees is necessary to provide skills and expertise for complex outcomes. Hierarchies fail to the extent that a hierarchical system of “surveillance, evaluation and direction” fails to provide reasonable performance information to employees creating mistrust between employee and employer and when tasks become highly unique and therefore impossible to evaluate in any meaningful way. Clan cultures succeed where there is a high degree of internal cohesion and goal congruence among organizational members as well as a high degree of discipline and overlap of individual and organizational interests. Clan cultures fail when subjected to the scrutiny of contractual relationships where individual performance is specifically negotiated (Ouchi, 1980; 1981).

Researchers have also suggested that strong, externally oriented cultures are more effective than weak, internally oriented cultures (Cameron, 1987; Arnold and Capella, 1985). Cameron and Ettington (1988), Zammuto and Krakower (1991), and others have suggested for example, the existence of “strong” cultural types permeated by assumptions of achievement, growth, and resource acquisition that facilitate rather than impede strategy. An alignment between the beliefs and values central to the organization and actual strategies is the central distinguishing feature of strong cultures (Dennison, 1990).

Managerial Strategy. The concept of “strategy” is broad and overarching, encompassing numerous older and newer conceptualizations including strategic planning (Chandler, 1962), strategic choice (Child, 1972), strategic management (Ansoff and Hayes, 1976), and strategic norms (Hatten, 1979). In a review of various concepts of strategy, Chaffee (1986) suggested the existence of three distinct models in the literature. Linear strategy, the oldest concept, involves setting long term goals through the use of planning and forecasting. Resources are then allocated to achieve organizational goals, which are primarily profit and productivity.

Adaptive strategy is concerned with developing a viable match between risks and opportunities in the dynamic external environment consisting of events, trends, competitors and organizational stakeholders. Adaptive strategy is more complex than linear strategy and considers more variables. It is by far the most heavily researched. The third model suggested by Chaffee is interpretive strategy, the newest concept. Interpretive strategy suggests individuals with free will enter into the organization. The organization’s continued existence lies in its legitimacy and ability to attract and keep individuals through symbols, interactions and relationships. Each model provides a means of distinguishing certain aspects of organizational functioning in which the concept of strategy has been applied. Chaffee (1986) has also suggested that a broad view of all research dealing with an aspect of strategy should be taken rather than attempting to select a narrow definitional segment that may exclude relevant research with slightly different definitions.

One typology of strategy measures implied in previous research on organizations is the existence of active and passive types of strategy (Miles and Snow, 1978; Snow and Hrebiniak, 1980; Cameron, 1986; Clott, 1994). Typically, passive organizations are reactive in nature while active organizations are constantly stimulating organizational change. An active strategy seeks to energetically manipulate the environment and construct it to suit the needs of the organization. Overall, active strategies have been more important in mitigating the negative effects of the turbulent environments now found in colleges and universities (Cameron and Tschirhart, 1992). Cameron’s (1986) study of administrators in colleges and universities suggests that when faced with a depletion of resources there is a tendency for organizations to become conservative and internally oriented, overly focused on cost containment, and reactive. The passive organization has been hypothesized by Snow and Hrebiniak (1980) to be successful only for short periods of time within stable, protected and relatively benign environments and “...generally not viable in competitive industries” (p.333). A further description of the passive strategy type suggests that it narrowly focuses on safeguarding the organizational niche at all costs (Hambrick, 1983). The linkage between managerial strategy and organizational effectiveness has also been noted in studies by Cameron and Zammuto (1983), Miles and Cameron (1982) and Doty, Glick and Huber (1993) as most strongly associated with improving effectiveness over time. The strategic emphases and choices of managers are considered by researchers to be critical factors in assessments of organizational effectiveness.

Culture and Strategy. The relationship between organizational culture and strategy has been addressed extensively in the literature (Ouchi, 1981; Deal and Kennedy, 1982; Tichy, 1983, Dennison, 1991). There has been little research in the organizational literature though, as to the exact causality of the relationship between the two variables. Much research is grounded for example, in the assumption that cultural values and patterns of behavior can limit and con-

strain the implementation of managerial strategy. Tichy (1983) and Zammuto and Krakower (1991) have addressed the implementation process as the need to align the overriding culture to strategic shifts in organizations. Davis and Schwarz (1981) suggested that a corporation's culture filters top management perspectives limiting the strategic options they are prepared to consider seriously. They further argued that defining the cultural values of a company culture can remove old constraints on past strategic decision making.

While the weight of the evidence appears to suggest that culture precedes strategy, the implication in general organizational theory that culture exists merely as a limiting factor to strategy does not take into account the existence of varying types of cultures. Research generally has been inconsistent and difficult to interpret in this area due to varied and often confusing empirical studies of culture and strategic types. Therefore, this study examines the independent and conditional effects of organizational culture and managerial strategy on the organizational effectiveness of a sample of business schools.

Methods. The subjects chosen for study were the academic deans of schools of business and schools of accountancy in the United States and Canada. Their titles included dean, director, or chairperson. These subjects were chosen because they are presumed to be the primary individuals involved with the external and internal environment of the organization and are considered to represent the "dominant coalition" in schools of business. Dominant coalition members are the key persons to determine managerial strategy as it impacts on the institution (Yuchtman and Seashore, 1967; Pennings and Goodman, 1977). A survey sample of 806 deans of graduate and undergraduate schools of business and accountancy comprising the entire population of American Assembly of Collegiate Schools of Business (AACSB) member institutions for the United States and Canada was selected for the study. Three hundred thirty completed surveys were returned for a 41 percent response rate. There was one response per school. Approximately 64 % of the respondents were from public institutions and 36% from private. Respondents were from small, 30.5% (50-1000 students enrolled in undergraduate/graduate business programs), medium, 38% (1001-2500 students) and large, 31.5% (over 2500 students) institutions. Approximately 21% of the respondents were deans of schools of business with only bachelors degree programs while 57% were deans of schools offering both bachelors and masters degree programs. Twenty-one percent (21%) were deans of schools with undergraduate, masters and doctoral degree programs. Demographic data on the respondent characteristics suggest a diversity of age, experience and work activity. Data was not collected on the number of faculty per college.

Variables. Scales reflecting organizational culture, strategic orientation and seven dimensions of organizational effectiveness were developed from items on the survey based

on previous research in effectiveness by Cameron (1986), Zammuto and Krakower (1991), and Cameron and Tschirhart (1992). The measure of organizational culture type of school of business in this study was derived from research performed by Ouchi (1980, 1981). The three types of culture utilized were 1) A **Clan** culture type identified through an emphasis on shared goals and values through consensus decision making. 2) A **Hierarchy** type identified through an emphasis on order, authority and efficiency. 3) A **Market** type identified through an emphasis on competitiveness, goal accomplishment and efficiency and through the mechanism of the marketplace. The three culture types and coefficient alphas for their respective scales were Clans (.72), Market (.68), and Hierarchy (.67).

There is some controversy about the measurement of organizational culture (Zammuto and Krakower, 1991). For example, some researchers have suggested that quantitative measures of culture are not appropriate to the measure of group social behavior because it is "too much a product of the social scientist's rather than participant's point of view" (Ouchi and Wilkins, 1985: 470). This is countered by others who believe that "the whole point of the contemporary study of organizational culture is to go beyond the method of the anthropologist by applying multivariate statistical analyses" (Ouchi and Wilkins: 478). This study utilized Likert measurement scales as suggested by researchers when correlation-based analyses (e.g., factor analysis, regression analysis) are performed (Quinn and Spreitzer, 1991). The Likert items assessed institutional character, leadership style, institutional cohesion, and institutional emphases. The items describe the core values and orientation of the institution.

Strategic orientation was assessed by Likert items that measured institutional behaviors and characteristics. These items were derived from research by Miles and Snow (1978). The two strategic types and their respective scales were active (.79) and passive (.70). An active strategy can be characterized as innovative and risk taking. A passive strategy can be described as insular, reactive, and risk averse.

The seven dimensions of organizational effectiveness were based on the Cameron (1978) effectiveness construct that examines perceived effectiveness of various domains of colleges and universities. The domains used in this study are student educational satisfaction (SES) (.71), ability to acquire resources (RES) (.72), system openness and community interaction (OPE) (.70), student career development (SCD) (.61), faculty employment satisfaction (FES) (.62), professional development and quality of faculty (PDF) (.81), and organizational health (OH) (.76). The variables, their definitions and coefficient alphas are listed in Table 1.

Results. A 3x2-multivariate analysis of variance (MANOVA) design was used to analyze the data. The two independent variables were culture type (clan, market, hierarchy) and management strategy (active or passive). The dependent variables were the seven dimensions of organizational effectiveness.

Multivariate tests were significant for both main effects (culture: Wilk's lambda = .84, $F = 2.83$, $p < .001$, and management strategy: Wilk's lambda = .85, $F = 5.14$, $p < .001$). However, there were no significant interactive effects between the two independent variables (see Table 2). Significant differences were established between each of the two independent variables and the dependent variables. Clan cultures were found to be more effective on three of the effectiveness dimensions than market or hierarchy cultures

(System Openness and Community Interaction, Student Educational Satisfaction, Faculty Employment Satisfaction, see Table 3). Active management strategies were found to be more effective than passive management strategies on six of the seven dimensions (Organizational Health, Ability to Acquire Resources, System Openness and Community Interaction, Student Educational Satisfaction, Student Career Development, Faculty Employment Satisfaction, see Table 4), regardless of type.

Table 1
Definition of Variables and Corresponding Alpha Coefficients

Independent Variables	Definition	Coefficient Alpha
Organizational Culture Clan	Emphasizes shared values and goals, participativeness, sense of family.	0.72
Market	Emphasizes competitiveness, goal accomplishment and production, consumer oriented.	0.68
Hierarchy	Emphasizes rules and regulations, clear lines of authority, efficient and directive.	0.67
Managerial Strategy Active	Innovative, continually developing, willing to break precedents.	0.79
Passive	Insular, unable to strategize for the future, infrequent change, no focused method to evaluate change.	0.70
Dependent Variables	Definition	Coefficient Alpha
Student Educational Satisfaction (SES)	The extent of student satisfaction with the educational response.	0.71 (3 items)
Ability to Acquire Resources (RES)	The extent to which the institution acquires resources from the external environment including finances, high quality students and faculty, research support, and political legitimacy.	0.72 (5 items)
Systems Openness and Community Interaction (OPE)	The emphasis placed on the interaction with, adaptation to, and service in the institution' external environment.	0.70 (4 items)
Student Career Development (SCD)	The extent of occupation or vocational development of students and the opportunities for occupational development provided by the institution.	0.61 (3 items)
Faculty Employment Satisfaction (FAS)	The satisfaction of faculty members with their employment and jobs at the institution.	0.62 (3 items)
Professional Development and Quality of Faculty (PDF)	The extent of professional attainment and development of the faculty, and the a of stimulation toward professional development provided by the institution.	0.81 (4 items)
Organizational Health (OH)	The extent of smooth functioning of the institution in terms of its processes and operations, including the benevolence and vitality of the institution.	0.76 (4 items)

Table 2
Culture by Management Manova of Seven Dependent Variables

Source of Variation	df	Wilks Lambda	F	p
Culture	14	.84	2.83	.001
Management Strategy	7	.85	5.14	.001
Culture x Management Strategy	14	.92	1.23	.246
Error	14	.93	1.03	.422

Table 3
Effectiveness Scale Score by Culture Type

	Clan	Market	Hierarchy
Professional Development and Quality of Faculty	19.55	20.45	18.81
Organizational Health	20.48	19.47	20.24
Ability to Acquire Resources	17.48	18.85	16.94
Systems Openness and Community Interaction	16.95*	13.18	14.63
Student Educational Satisfaction	13.57*	11.81	12.52
Student Career Development	16.34	16.49	15.74
Faculty and Administrator Employment Satisfaction	15.21*	12.56	14.13

*p<0.05

Table 4
Effectiveness Scale Score by Managerial Strategy

	Active	Passive
Professional Development and Quality of Faculty	20.32	18.89
Organizational Health	21.84*	18.29
Ability to Acquire Resources	19.12*	16.40
System Openness and Community Interaction	16.35	13.49
Student Educational Satisfaction	13.22*	12.05
Student Career Development	16.76*	15.61
Faculty and Administrator Employment Satisfaction	15.36*	12.56

*p<0.05

Conclusion

These findings provide evidence for differentiation of the three types of internal organizational culture as hypothesized by Ouchi (1980). Clan and market cultures comprise approximately half of the institutions surveyed with hierarchical institutions comprising the remainder. Clan cultures were found to be more effective, as expected, on the dimensions that focus on the individual (Student Educational Satisfaction and Faculty Employment Satisfaction) and on the perceived "openness" of the school of business (System Openness and Community Interaction). Clan cultures can be described as having a sense of family, with a common goal. However, no statistically significant differences were found between the three culture types on the other four di-

mensions of effectiveness, suggesting that for business schools, the effectiveness dimensions that are more externally focused are not affected by the culture type of the organization (e.g., Professional Development and Quality of Faculty, Organizational Health, Ability to Acquire Resources, and Student Career Development).

We suggest several possible explanations for this lack of effect. First, the lack of effect of culture type on the externally focused effectiveness domains may be a result of the external environment. Today's environment for higher education is particularly tumultuous. The public is demanding more accountability; economic stresses upon institutions are increasing, and changing student demographics are affecting the environment in a number of unpredictable ways. These factors may be suppressing the impact of culture type on the externally focused effectiveness domains (Shein, 1996). Secondly, while the data suggested the primary culture type, it did not indicate the "strength" of the culture. Previous research has suggested that an alignment between the beliefs and values central to the organization and actual strategies is the central distinguishing feature of strong cultures (Dennison, 1990). There may be subordinate cultures operating at the department level that flourish within the larger institutional culture, but do not necessarily align with the primary culture's beliefs and values (Wilkins and Ouchi, 1983). Subordinate cultures may negate the effect of the primary culture. Finally, the lack of effect of culture type on the externally focused domains may be due to the fact that organizational members of business schools have unique values and orientation due to the nature of the disciplines (Cheit, 1985; Hugstad, 1983). Members of professional schools are aligned to their academic department and discipline and often to their professional practice (Clark, 1989). Professional schools expect their faculty to keep current with the profession through active practice. There may be a tension between the "academic world" and the "applied world" that weakens the overall culture of the organization. Applied environments are focused on short-term results, rapid decisions, teamwork, and practical application of theory and knowledge. Academic environments on the other hand, are typically slow and deliberate in their decision making, focus on the long-term, and stress the abstract. While professional school faculties intentionally attempt to bridge the gap between academics and practice, that tension may diminish the overall effectiveness of the organization.

The study essentially corroborates previous research suggesting that managerial strategy is a strong indicator of organizational effectiveness (Child, 1972; Cameron, 1983). The active management strategy was found to be more effective on six of the seven dimensions of effectiveness regardless of culture type. The results suggest that management strategy works independently of culture type, and that regardless of culture type, leaders should strive to be active in their strategies rather than passive. Additional research should address the differences between graduate and undergraduate programs. No effort was made in this study to sepa-

rate graduate business programs from undergraduate business programs but rather to address the nature of business schools in total. Are there differences in perceptions as related to the existence of graduate programs alongside undergraduate programs? The great bulk of discussion on business schools in the popular and business press centers around Masters in Business Administration (MBA) programs. It is unclear if the presence of graduate programs differentially effect any of the institutional effectiveness outcomes examined in this study.

The study is limited by its reliance on one respondent per school. A richer picture of the institution would have been developed had there been several responses from each school. A larger number of responses that included faculty members would have also allowed us to gauge the strength of the primary culture type. However, the study begins to build an understanding of the uniqueness of professional schools and the dilemmas they face that may be different from higher education in general. As more and more students enter higher education specifically to gain a professional expertise and gainful employment, understanding the special characteristics of professional schools is essential in measuring organizational effectiveness.

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Traditional vs. “Resampling” Approaches to Statistical Inferences Regarding Correlation Coefficients

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Abstract

With the ever-increasing use of computers in data analysis, there has been a movement to abandon traditional parametric approaches, with all of their restrictive assumptions, in favor of computer-intensive nonparametric inferential statistical procedures such as the jackknife and the bootstrap that are based upon resampling of the sample data. In this article these techniques are compared and contrasted with the parametric approach, with special emphasis on inferences regarding correlation coefficients.

Introduction

Educational researchers are often interested in making a statistical inference regarding a population correlation coefficient (Pearson product-moment) when they have data for a sample from that population. The most common approach is to test the null hypothesis that in the population there is no linear relationship between two variables X and Y, so they carry out a t test of the significance of the sample correlation coefficient, using the formula $t = r / [(1-r^2)/(n-2)]^{.5}$, for n-2 degrees of freedom, where r is the sample correlation and n is the sample size (see, for example, Agresti and Finlay, 1986, pp. 272-274). Testing some hypothesis other than 0 or constructing a confidence interval around the sample r is a bit more complicated, because both require Fisher’s r-to-z transformation.

But what about the underlying assumptions? Is variable X “fixed” or “random”? If it is fixed, is Y normal and homoscedastic? If random, are X and Y bivariate normal? Those who are concerned about such assumptions have recently been attracted to the nonparametric “resampling” approach to statistical inference, where such assumptions are relaxed or not necessary.

This article compares and contrasts the traditional parametric approach with the two most popular resampling approaches, “the jackknife” and “the bootstrap”, using an example involving the relationship between LSAT score and GPA for 15 law schools. This example was first introduced by Efron (1979) and has been used by several authors (see, for example, Efron, 1982; Diaconis and Efron, 1983; Efron and Gong, 1983, Efron and Tibshirani, 1993, and Lee and Rodgers, 1998).

Methods

The example

The data are as follows (note that the unit of analysis is the law school, not the individual student):

School	Average LSAT (X)	Average Undergraduate GPA (Y)
1	576	3.39
2	635	3.30
3	558	2.81
4	578	3.03
5	666	3.44
6	580	3.07
7	555	3.00
8	661	3.43
9	651	3.36
10	605	3.13
11	653	3.12
12	575	2.74
13	545	2.76
14	572	2.88
15	594	2.96

The Traditional Approach

In the traditional approach the sample correlation coefficient would be calculated and tested for statistical significance and/or a confidence interval for the population correlation coefficient would be constructed.

“Jackknifing”¹

About 50 years ago Quenouille (1949) developed a general nonparametric procedure for estimating sampling error when one is unable or unwilling to make the assumptions that are necessary for the traditional parametric approach to statistical inference. This method was later popularized by Tukey (see Tukey, 1958; Mosteller and Tukey, 1977; and elsewhere). It proceeds as follows:

1. Calculate the sample statistic for the entire sample of size n; call that y_{all} (where Y is the dependent variable).
2. Calculate n jackknifed values $y_{(i)}$ for that statistic by deleting from the sample data a different observation each time. (A variation is sometimes employed whereby more than one observation is deleted each time.) This “sampling of the sample” treats the sample observations as miniature representations of the unknown population observations.

3. Calculate n “pseudovalues” y^*_j for that same statistic. These pseudovalues are not necessarily on the same scale as the original statistic, but they are a set of numbers whose sampling variability is on a par with what would be obtained by random sampling of the population. (The sampling variability of the $y_{(j)}$ is too small, since they only differ from the original statistic by using just one fewer observation). The formula for the pseudovalues is: $y^*_j = n(y_{all}) - (n-1)(y_{(j)})$.
4. Calculate the mean of the pseudovalues and the standard error of that mean, and use the standard error to carry out a significance test and/or to construct a confidence interval.

“Bootstrapping”²

Unlike the jackknife for which the resampling is **without replacement** (where each jackknifed statistic is based upon $n-1$ of the n observations), the bootstrap approach tries to resolve the inference dilemma by “sampling the sample” **with replacement** (where each bootstrapped statistic is based upon n observations). It usually accomplishes this by a simulation process (you can’t properly bootstrap without a computer), as follows:

1. Copy the sample data a large number of times (Diaconis and Efron, 1983, give the figure of a billion times!)
2. Sample n observations from this “population” k times (where k is also very large).
3. Calculate the statistic of interest for each sample and generate the empirical sampling distribution for that statistic.
4. Calculate the standard deviation (standard error) of that sampling distribution and make the appropriate inference.

Results

The Traditional Approach

The sample r is .776 and Fisher’s $z = 1.035$. For $n = 15$ that correlation is statistically significant at the .05 level and the 95% confidence interval for the population correlation extends from .469 to 1.601 on the Fisher’s z scale and from .437 to .922 on the r scale (again see Agresti and Finlay, 1986, pp. 272-274 for details).

Jackknifing

The jackknifed statistics, pseudovalues, mean pseudovalue, and standard error are displayed in Table 1. Since the estimated standard error is .143, an appeal to robustness or to Chebyshev’s inequality would suggest that the r of .776 is significant at least at .05, and the 95% confidence interval would extend from about .496 to about .999. (The upper limit is actually greater than 1, but it is conventional to cut it off just below 1.)

Bootstrapping

For bootstrapping of these data, 1000 samples of size 15 were drawn from that “population” of bivariate observa-

tions. The empirical sampling distribution of the 1000 bootstrapped correlations is displayed in Table 2. Those correlations ranged from .251 to .990, with a mean of .774 and a standard deviation (standard error) of .128. The distribution was highly skewed. The middle 95% of the distribution extended from about .460 to about .960, so the null hypothesis that the population correlation is zero would be rejected, and one could be “95% confident” that the interval from .460 to .960 would “cover” the true value of that population correlation.

Table 1

Jackknife results for the law schools data.

omitted observation j	$y_{(j)}$	pseudovalue y^*_j
1	.893	-.862
2	.764	.944
3	.755	1.070
4	.776	.776
5	.731	1.406
6	.780	.720
7	.785	.650
8	.736	1.336
9	.752	1.112
10	.776	.776
11	.818	.118
12	.786	.636
13	.740	1.280
14	.767	.902
15	.780	.720

mean pseudovalue = .772 (a slight bias)
estimated standard error = .144

Table 2

Sampling distribution of 1000 bootstrapped correlations.

r	Frequency	%	Cumulative %
below .260	2	.20	.20
.260 to .299	1	.10	.30
.300 to .339	2	.20	.50
.340 to .379	2	.20	.70
.380 to .419	7	.70	1.40
.420 to .459	8	.80	2.20
.460 to .499	14	1.40	3.60
.500 to .539	13	1.30	4.90
.540 to .579	28	2.80	7.70
.580 to .619	42	4.20	11.90
.620 to .659	58	5.80	17.70
.660 to .699	75	7.50	25.20
.700 to .739	95	9.50	34.70
.740 to .779	131	13.10	47.80
.780 to .819	117	11.70	59.50
.820 to .859	104	10.40	69.90
.860 to .899	125	12.50	82.40
.900 to .939	121	12.10	94.50
.940 to .979	53	5.30	99.80
above .979	2	.20	100.00

mean = .774 (a slight bias)
estimated standard error = .128

Discussion

For this example all three approaches yielded similar results, with slightly different standard errors. For other data sets the results might not agree nearly as well.

The most obvious advantage over the traditional approach for both jackknife and bootstrap is that there is no need to assume population normality or homoscedasticity. The most obvious disadvantage is the greater amount of computational time necessary for either of those resampling approaches.

Perhaps a more interesting comparison is between jackknife and bootstrap. The bootstrap technique is somewhat easier to understand, primarily because the jackknife “pseudovalues” are unfamiliar. (Since they do not have to be on the same scale as the statistic of interest, the pseudovalues for correlation coefficients are often less than -1 and greater than +1.) And the mathematical statisticians claim that the bootstrap has some important technical advantages (for example, it appears to work better for non-linear statistics such as the sample median--see Mooney and Duval, 1993). One problem, however, is that in bootstrap sampling you may draw the same observation every time. It was at least theoretically possible, although highly improbable, that Law School #1, for example (which is actually an outlier), could have gotten sampled 15 times in one of the samples of 15 observations, rendering that sample atypical of the original data and making it impossible to even calculate its Pearson r , since there would be no variability in either X or Y . (See Wainer and Thissen, 1975 for an example of the effect of an outlier on the jackknife approach.) In this application the “worst” samples in that respect were one sample in which School #14 was drawn six times and another sample in which School #15 was drawn six times.

The jackknife may be easier for most people to implement, and it avoids the problem of non-independence of the observations when the same unit is sampled more than once. It has the additional advantage that you don't have to trust random (actually pseudorandom) number generators. (See Whitney, 1984 for a discussion of problems with pseudorandom numbers.)

Some Final Comments

There is nothing special about correlation coefficients. Jackknifing and bootstrapping have been applied to means, standard deviations, percentiles (e.g., medians), R -squares, and many other statistics, with very encouraging results. (See Fan and Wang, 1996 for an interesting comparison between bootstrap and jackknife alternatives to canonical correlation analysis.) However, resampling approaches must not be oversold the way that non-parametric statistics in general were oversold in the 1950s and 1960s. If for a given situation parametric assumptions such as normality and

homoscedasticity are met or “near-met” (by an appeal to robustness) it is a waste of time and effort, to say nothing about a potential lack of power, to jackknife or bootstrap.

Footnotes

¹ The term “jackknife” is due to Tukey. He used the analogy to an ordinary jackknife, which is a very useful tool for many purposes.

² The term “bootstrap” is due to Efron. When people get into trouble, e.g., in statistical inference, they shouldn't give up; they need to pull themselves up by their bootstraps.

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