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Greetings EERA Colleagues:

While this may be the shortest issue EERA has ever published in 16 years, it is not without richness and diversity of issues, research venues, or authors. In six papers we cover key issues and innovative trends in education dealing with science, technology, testing, and management as well as softer reflective pieces. Some articles deal with k-12 areas and others with higher education. The Conrad and Conrad and Fincher and Katsinas articles address perspectives on leadership in education. Curriculum and instructional delivery factor into the Lewis and Moin and Hodges pieces. Pearson, Nichols, Zimmerman, and Lombardo address high stakes testing in public schools while Hunt looks at ways of keeping public school teachers in the field.

We are looking forward to the 2007 edition, which will feature issues in special education as well as other research pieces. We hope to see you at EERA in sunny Clearwater Beach in February 2007. In the meantime, enjoy the 2006 issue.

Best,

Darla Twale, Editor
Professor
University of Dayton

Social Capital, Teacher Perceptions of Control, And Implications for the School Work Environment

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The number one reason why teachers leave the field is burnout (LeCompte & Dworkin, 1991). Perceived lack of control has been linked with burnout. This paper explores the question of where do perceptions of control come from and demonstrates that social capital influences perceptions of control. This critical link points to the importance of social capital for job satisfaction and keeping teachers in the field of education. For this study, social capital was represented by communication, trust, and collegiality. Social capital helped increase teachers' perceptions of professional control over curricular decisions and instructional decisions.

Gerald and Hussar project that we will need a total of 3.6 million teachers by 2013 (2004). Part of this need can be addressed by more effectively keeping teachers in the field. The number one reason why teachers leave the field is burnout (LeCompte & Dworkin, 1991). Estimates of new teacher turnover range from 25% within the first 3 years up to half of all teachers leaving within their first 5 years (Charters, 1970; Darling-Hammond, 2000; Henke & Zahn, 2001; Mark & Anderson, 1985). Perceived lack of control has been linked with burnout (Bandura, 1993). This paper explores the question of where do perceptions of control come from and demonstrates that social capital influences perceptions of control. This critical link points to the importance of social capital for job satisfaction and keeping teachers in the field of education.

Social capital is the development of relationships that permit the use or transfer of collective resources by individuals or groups, allowing them to achieve the goals of themselves or others more effectively and efficiently. This definition was distilled from the works of social capital theorists Coleman (1988), Coleman and Hoffer (1987), Bourdieu (1977, 1986), Portes (2000), and Putnam (1993, 1995). This paper examined the following questions: (a) Does social capital as represented by communication, trust, and collegiality increase teachers' perceptions of control over curricular decisions? (b) Does social capital as represented by communication, trust, and collegiality increase teachers' perceptions of control over instructional decisions?

Perceptions of control influence teacher job satisfaction, motivation, longevity on the job, and student performance (Bandura, 1993). This being the case, identifying factors which influence such perceptions of control is of critical importance for policy and practice. This study specifically looked at the connection between social capital and perceptions of control.

Literature Review

The connection between teachers' perceived control and teacher longevity has been demonstrated by Bandura's (1993) self-efficacy research. He found that as teachers' perceived control over their own level of functioning increased, both students' learning and teaching longevity on the job also increased. Additionally, in attribution models (to what does a person attribute success), increased control led to increased expectation of influence and, in turn, to increased motivation (Weiner, 1985). Perceptions of control relate to how teachers experience success in the work environment.

Self-efficacy

Perceived lack of control can lead to a perceived lack in ability (i.e., efficacy), demoralization, physical and emotional exhaustion, weak commitment to teaching, decreased performance of the teacher and, in turn, failure (Bandura, 1993). By contrast, individuals who believed they could control group processes continued to set challenging goals and achieved high group performance. Teachers who felt high degrees of efficacy were better able to overcome their fears and failures and persevere. The importance of perceived teacher control cannot be overemphasized, especially given that teacher burnout is the number one reason teachers have left the field (LeCompte & Dworkin, 1991). In this study, perceptions of control are examined through perceived control over instructional decisions and curricular decisions.

Social capital also offers a powerful conceptual model to understand and decrease teacher turnover. Numerous social capital researchers consistently placed an emphasis on communication, trust, and relationship (Bourdieu 1977, 1986; Coleman, 1988; Coleman & Hoffer, 1987; Portes 2000; Putnam 1993, 1995). The variables communication, trust, and collegiality were used to represent social capital. Communication lays the foundation for trust and collegiality. Together, these three aspects of social capital portray the strength of relationship that teachers feel toward one another and the principal. This relationship, in turn, influences teachers' perceptions of control over their curricular decisions.

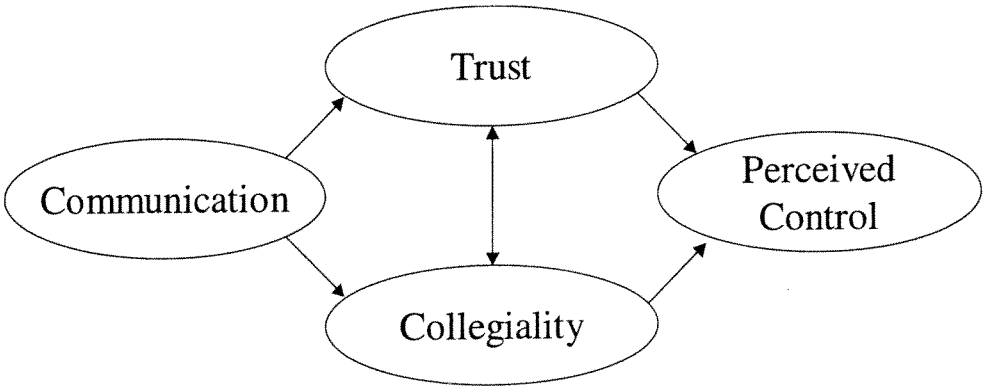

Figure 1. Aspects of social capital and the hypothetical influence on teachers' perceptions of control over curricular and instructional decisions.

The selection of these three aspects, in addition to reflecting the strength of relationships between persons, also closely corresponded to Putnam's (1995) operationalization of social capital. Putnam suggested that reading newspapers, trust, and community involvement captured the essence of social capital. Putnam's use of newspaper circulation at the community level was a specialized form of communication. Community involvement reflected an identification with the community, which can be considered roughly parallel to identification with, and sense of belonging to, a group at the organizational level (i.e., collegiality). Portes (2000) argued that Putnam's operationalization more accurately captured the concept of social capital than other models and endorsed it as non-circular and quantifiable.

Within Coleman's (1988) Model, in

particular, social capital was comprised of (a) how strong the ties were between persons; (b) the number of contexts[1] in which persons know one another (such as church and school); and (c) connections between generations, such as children, parents, and grandparents. The focus of this study was on how strong the relationships were between educators.

Social Capital and Perceptions of Control

This study examined how social capital influenced perceptions of control. This key relationship is represented in the center of Figure 2. Additionally, as the left side of Figure 2 illustrates, there were several elements that influenced social capital and perceived control. These included school and district characteristics, personal background of the teachers, and professional qualities of the teachers. These elements were included as control variables (See Methods). Further, literature has also demonstrated that perceptions of control influence motivation, job satisfaction, teacher longevity, and student performance (Bandura, 1993). This connection with performance and teacher retention literature is represented by the dotted rectangle on the right side of Figure 2. This rectangle points out the importance of social capital beyond that of influencing teachers' perceptions of professional control.

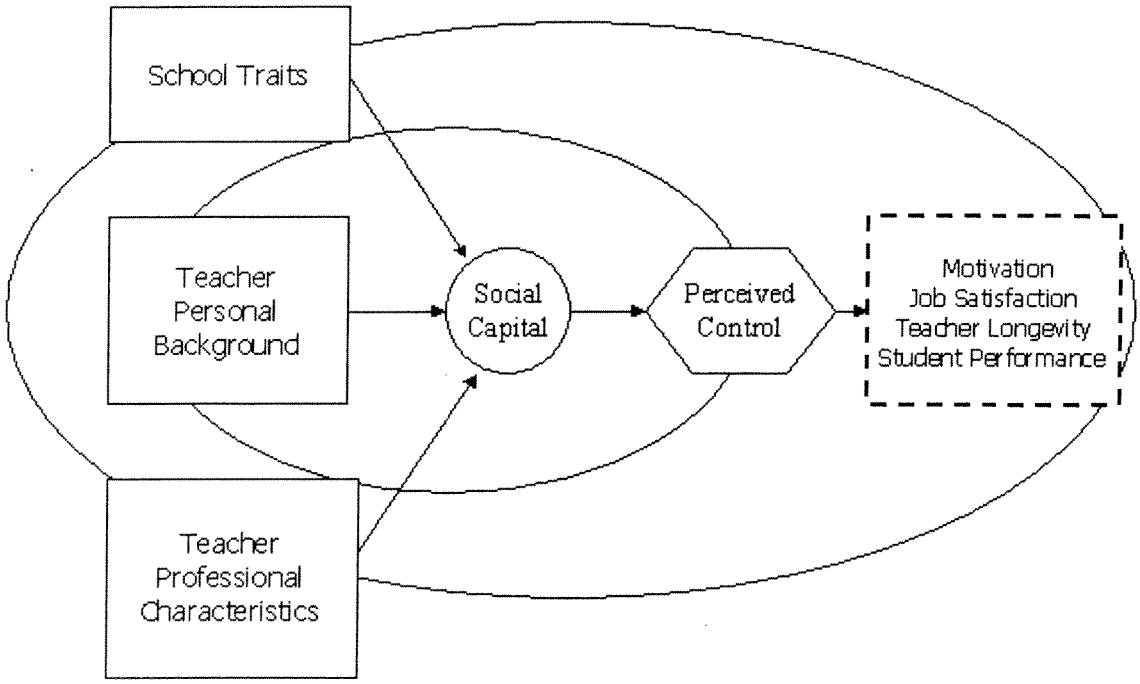

Figure 2. A hypothetical model of social capital and how it influences teachers' perceptions of control over curricular and instructional decisions and, potentially, outcomes in the literature stemming from perceptions of control. The rectangles on the right represent environmental and personal influences.

Methods

Participants and Instrument

The dataset used for this paper was the 1993-94 Schools and Staffing Survey (SASS). SASS is a nationally representative sample of teachers. Surveys were sent to 56,736 teachers and 47,105 teachers responded. Out of those respondents, 39,832 teachers answered all the questions included in these analyses (84.6% of the overall 47,105).

SASS was a multi-stage sample. The school sample was a stratified probability

sample, and the strata took into account characteristics such as urbanicity, school enrollment, percent minority, and highest grade in school (Kalton, Winglee, Krawchuk, & Levine, 2000). The target population for the SASS Teacher Survey was all elementary and secondary teachers in Grades K-12. Teachers in SASS were a sub-sample of teachers within each school selected. The unit of analysis was teachers and the list frame was the schools identified for the SASS School Survey. This study looked at public schools, not including Bureau of Indian Affairs or charter schools.

Procedures

Weighting the sample. Both weighted and unweighted analyses were conducted. The final analyses were weighted so that allocated samples would be nationally representative (Kalton et al., 2000). Weighting was added to SASS to compensate for nonresponse bias, to take into account school selection probabilities, and to improve precision of sample estimates. The overall weight provided by SASS was divided by the mean weight for the model (i.e., specific variables in a particular analysis) being examined. This approach provides a reasonable estimate of the standard errors (Peng, 2002). There were no substantive differences between unweighted and weighted analyses, and NCES recommends using weighted analyses, so only the weighted results are reported here. Once the preliminary analyses were completed, and the scales finalized, cases with missing values were deleted and the same final weight was used for all additional analyses.

The variables. The independent and dependent variables were scale variables that were conceptually driven and then tested through alpha reliability analysis, Principal Component Analysis, and Maximum Likelihood Estimation. Alpha coefficients are reported here, and additional details are reported in Appendix A. Nunnally (1978) and Spector (1992) both recommended that alpha coefficients should be .70 for a scale to demonstrate internal consistency.

The dependent variables were "Instructional Control" and "Curricular Control." Questions for control over curricula and control over instruction were on a Likert-type scale ranging from 0 (*No influence*) to 5 (*A great deal of influence*). Instructional control was created from three questions on "how to teach" (amount of homework to assign, as well as evaluation and teaching techniques). Curricular control was created from three questions on "what to teach" (establishing curriculum, selecting textbooks and materials, and choosing content and topics). The average for teachers' perceived control was 4.43 for instructional control and lower for curricular control with 3.35. The alpha coefficients were both .72.

All the questions for the independent variables of communication, trust, and collegiality ranged from 1 (*Strongly agree*) to 4 (*Strongly disagree*). Communication comprised six questions with themes such as relaying expectations and priorities, discussing and coordinating teaching practices, and recognition. The alpha coefficient was .80, $M = 3.00$, and $SD = 0.60$. Trust included questions relating to fairness, support, receiving back-up, and consistency. The mean was 3.10 and the standard deviation was 0.58, with an alpha of .78. Collegiality questions focused on participation, cooperation, disagreement with rules (reverse coded), and shared beliefs. The mean of the collegiality scale was 3.04 with a standard deviation of 0.52. The alpha coefficient was .63.

In order to isolate the effects of social capital as much as possible, several control variables were included under the categories of school traits, personal background, and professional qualities. School traits take into account the organization and setting the teachers worked within, including enrollment, urbanicity, percent minority teachers, percent minority enrollment, and base salary. These variables address social capital aspects such as the size of the network, external pressures, and potential cohesion or unity of the group. In the latter case, more homogeneous settings would presumably share more of the same ideals, values and goals providing a stronger sense of group identity. Thus, a school that has a mostly White faculty or a mostly Black faculty could have more social capital than a school with a split staff. Coleman and Hoffer (1987) discussed the challenges of a

non-homogeneous setting. Personal and professional traits were included because of the potential influence over teacher perceptions of their job and specifically perceptions of control. Personal traits included race, gender, marital status, children, and age. Professional traits included total experience, highest degree earned, new teacher, and subject taught.

Results

Prior to examining the relationships between all the variables, the scale variables needed to be examined. Since the three independent variables represented dimensions of a larger concept (social capital), it was important that the correlations be strong, but not such that multicollinearity was an issue[2]. Table 1 shows the correlation results for the independent and dependent variables. Communication and trust had a strong correlation among the independent variables (.76). Additionally, collegiality had the largest coefficient for both curricular and instructional control.

Table 1

Correlations Between Independent and Dependent Variables

	Communi-cation	Trust	Collegiality	Curricular control	Instructional control
Communication	1				
Trust	0.76***	1			
Collegiality	0.62***	0.68***	1		
Curricular control	0.19***	0.24***	0.30***	1	
Instructional control	0.14***	0.21***	0.21***	0.48***	1

SOURCE: The 1993 School and Staffing Survey, Public Use Data Provided by the National Center for Education Statistics. Total listwise $N = 39{,}832$.

Regression Analyses

The relationship between teachers' perceptions of control over instruction and the social capital indicators was examined using multiple regression[3]. After controlling for teacher and school characteristics, the three indicators of social capital were entered in the models starting with communication and ending in collegiality. Regression predictors were entered in hierarchical or blockwise method (Field, 2000). This method was chosen because using stepwise entries could create artificial results that may be mathematically significant but lack substantive meaning. The order of variables entered was based on the literature review and the conceptual model presented earlier. Communication was entered first, followed by trust, and then collegiality.

Four analyses were conducted with curricular control as the dependent variable and then the process was repeated with instructional control. The full list of variables with regression coefficients and R^2 are included in Tables 2 and 3. Effect sizes are shown through standardized beta coefficients. Standardized betas were

chosen because most of the scales are substantively difficult to interpret, such as a one unit change in trust. Additionally, standardized betas also allow comparison of the relative influence of variables with different metrics across models. Regression analyses with partial correlations are also included in Appendices B and C.

Curricular Control

In the first model, only the control variables were included to establish a baseline. The variables with the largest coefficients were school enrollment, the percent of minority teachers present in the school, and certain subject areas taught. In Model 1, for teacher perceptions of curricular control, dummy variables for "area taught" revealed all other subjects felt more control over curricular decisions than "general elementary classroom" teachers. At the top of this list was the category of 'secondary other' (.22, $p < .001$)[4]. Secondary other referred to any teaching position in secondary school that did not fall under one of the other categories (such as 'secondary, English'). Secondary other remained the highest coefficient across all four models that examined curricular control. Following secondary other, the second largest coefficient was .15 for vocational/technical ($p < .001$). Three other variables also created from teacher subject were worth noting: 'elementary other' (.12, $p < .001$), secondary special education (.13, $p < .001$), and elementary special education (.10, $p < .001$).

Table 2
Control Over Curriculum Decisions, Standardized Beta Coefficients, Weighted

	Model 1	Model 2	Model 3	Model 4
Enrollment	-0.100***	-0.094***	-0.086***	-0.066***
Urban	-0.079***	-0.079***	-0.079***	-0.081***
Suburban	-0.071***	-0.079***	-0.084***	-0.088***
% Minority Teachers	-0.092***	-0.087***	-0.072***	-0.057***
% Minority Enrollment	-0.056***	-0.062***	-0.058***	-0.050***
Subject: Elementary Other	0.124***	0.126***	0.127***	0.130***
Subject: Elementary Special Ed.	0.100***	0.101***	0.101***	0.106***
Subject: Secondary Other	0.217***	0.242***	0.253***	0.259***
Subject: Secondary Special Ed.	0.128***	0.140***	0.148***	0.155***
Subject: English	0.101***	0.120***	0.131***	0.137***
Subject: Mathematics	0.030***	0.048***	0.058***	0.061***
Subject: Science	0.081***	0.100***	0.109***	0.111***
Subject: Social Studies	0.071***	0.089***	0.101***	0.107***
Subject: Vocational/Technical	0.153***	0.163***	0.173***	0.177***
Number of Children	-0.002	-0.003	-0.004	-0.003
Divorced, Widowed, Separated	-0.016**	-0.014**	-0.011*	-0.008
Never Married	-0.030	-0.024***	-0.022***	-0.019***
American Indian	0.006	0.005	0.006	0.007
Asian	0.049***	0.050***	0.048***	0.046***
Black	0.021***	0.001	0.006	0.015**
Hispanic	0.032***	0.028***	0.031***	0.034***
Male	0.012*	0.018***	0.016**	0.024***
Base Salary	0.055***	0.068***	0.066***	0.059***
Age	-0.073***	-0.082***	-0.080***	-0.083***
Total Experience	0.018*	0.016*	0.022**	0.025**
Highest Degree	-0.027***	-0.022***	-0.022***	-0.015**
New Teacher	-0.007	-0.018**	-0.019***	-0.022***
Communication		0.235***	0.061***	-0.004
Trust			0.233***	0.122***
Collegiality				0.246***
Adjusted R^2	.117	.170	.192	.221

SOURCE: The 1993 School and Staffing Survey, Public Use Data
Provided by the National Center for Education Statistics

*** Significant at the 0.001 level (2-tailed).
** Significant at the 0.01 level (2-tailed).
* Significant at the 0.05 level (2-tailed).

The second model examined to what degree communication increased teachers' perceptions of control over instructional decisions. Model 2 explored the relationship between teachers' perceptions of control and how much information was relayed among teachers and between teachers and administrators. The adjusted R^2 was .17. In Model 2, communication had the strongest predictor effect of any variable (.24, p <.001), excluding secondary other, on teachers' perceptions of control over curriculum

decisions. This finding suggested that communication positively influenced teachers' perceptions of their control over curricula.

Model 3 examined the influence of trust on teachers' perceptions of control over curricular decisions and to see if trust explained part of communications' effect on perceptions of curricular decisions. When trust was added, the adjusted R^2 increased to .19, indicating a significant increase in explaining the variation in teachers' perceptions of curricular control. Trust was a stronger predictor, with the exception of secondary other, and had a standardized coefficient of .23 (p <.001), than all other variables in the model, except for teaching secondary other. While communication remained statistically significant, the coefficient was dramatically reduced and dropped to .06 (p <.001). This result suggested that trust explained the majority of communications' effect and that without trust, communication had less of an effect.

Model 4 added collegiality to the analyses of teacher perceptions of curricular control in order to look at to what degree collegiality increases teachers' perceptions of control over curricular decisions. The regression formula used for the final analyses was as follows:

Y_i (Curricular Control) = β_0 + β_1 (Communication) + β_2 (Trust) + β_3 (Collegiality) + $\acute{\varepsilon}_I$

Collegiality had the second largest standardized coefficient in the model and, in fact, was the second largest coefficient of any of the models conducted against the dependent variable of curricular control (.25, p <.001). This relationship suggested that the collegiality shared among teachers and their administrators attenuated the pressures that make teachers feel less in control. Moreover, collegiality appeared to absorb some of the influence of communication and of trust. Communication became non-significant, and trust dropped down to .12 (p <.001). Although communication became negative, the coefficient was extremely small (-.004) and close enough to zero as to reflect no substantive change as curricular control changed. Additionally, the adjusted R^2 was now over .20. The National Center for Education Statistics has recommended that the R^2 be at least .20 for a dataset this large (Peng, 2000).

The control variables changed with the addition of each social capital variable and followed the same pattern throughout. As each model was analyzed, the enrollment coefficient decreased with the addition of each social capital variable. In Model 1, the enrollment coefficient was -.100, in Model 2 it was -.094, and in Model 3 enrollment effect decreased to -.086, and finally became -.066 in Model 4. This steady decrease in strength reflected a change in coefficient between Model 1 and Model 4 of .034. While only a small change, some coefficients less than .034 were significant at the .001 level, and this decrease in the enrollment coefficient may indicate that social capital obscured some of the perceived lack of control felt by teachers in larger schools. A similar pattern could be seen in percent minority teachers, where curricular control decreased by .035 from Model 1 to Model 4, changing from -.092 up to -.057.

These changes contrasted with the subject matter coefficients, which went up in all four models. For example, English increased .04 (from .10 up to .14) and secondary other increased .028 (from .200 up to .228). Here again, this shift between models may have indicated that once social capital was held constant the effect of these variables became more readily apparent.

Instructional Control

When social capital's influence on perceptions of curricular control was contrasted with the influence on instructional control, some important similarities and differences appeared. First of all, it is important to note that the R^2 was smaller for each of these models, so caution must be used in drawing any conclusions from the analyses looking at instructional control.

Table 3

Control Over Instructional Decisions, Standardized Beta Coefficients, Weighted

	Model 1	Model 2	Model 3	Model 4
Enrollment	-0.022***	-0.017**	-0.009	0.008
Urban	-0.025***	-0.025***	-0.025***	-0.026***
Suburban	-0.018**	-0.024***	-0.03***	-0.033***
% Minority Teachers	-0.037***	-0.033***	-0.016*	-0.004
% Minority Enrollment	-0.013	-0.017*	-0.012	-0.006
Subject: Elementary Other	0.028***	0.029***	0.03***	0.033***
Subject: Elementary Special Ed.	0.027***	0.028***	0.028***	0.031***
Subject: Secondary Other	0.128***	0.145***	0.159***	0.163***
Subject: Secondary Special Ed.	0.064***	0.073***	0.082***	0.088***
Subject: English	0.071***	0.085***	0.098***	0.103***
Subject: Mathematics	0.055***	0.068***	0.08***	0.082***
Subject: Science	0.07***	0.083***	0.093***	0.095***
Subject: Social Studies	0.065***	0.078***	0.091***	0.096***
Subject: Vocational/Technical	0.084***	0.091***	0.103***	0.106***
Number of Children	0.013*	0.012*	0.012*	0.013*
Divorced, Widowed, Separated	-0.012*	-0.01*	-0.006	-0.004
Never Married	-0.03***	-0.026***	-0.023***	-0.021***
American Indian	-0.001	-0.001	-0.000	0.001
Asian	0.02***	0.021***	0.019***	0.017***
Black	0.023***	0.009	0.015**	0.022***
Hispanic	0.003	0.000	0.003	0.005
Male	-0.029***	-0.025***	-0.027***	-0.021***
Base Salary	0.025***	0.034***	0.031***	0.025***
Age	-0.061***	-0.067***	-0.065***	-0.067***
Total Experience	-0.013	-0.015	-0.008	-0.006
Highest Degree	-0.015**	-0.012*	-0.011*	-0.006
New Teacher	-0.001	-0.009	-0.010	-0.012*
Communication		0.167***	-0.04***	-0.09***
Trust			0.277***	0.191***
Collegiality				0.191***
Adjusted R^2	.029	.055	.086	.104

SOURCE: The 1993 School and Staffing Survey, Public Use Data
Provided by the National Center for Education Statistics

*** Significant at the 0.001 level (2-tailed).
** Significant at the 0.01 level (2-tailed).
* Significant at the 0.05 level (2-tailed).

Communications played a potentially important role as indicated by Model 2. In Model 3, trust may have played a very important role, and .277 (p <.001) was the highest coefficient in any of the models (see Table 3). Additionally, with the inclusion of collegiality, trust and collegiality had the same coefficients at .191 (p <.001).

Limitations

As with any large scale quantitative analysis, one must keep in mind that the subtle nuances and distinctions can become obscured. In some settings, for example, social capital may be an integral part of a given school's instructional success, whereas that pattern is not as clear on a national level. This quantitative study provides insights into the importance, on a national level, of social capital to teachers' perceptions of control. Future research using qualitative methods and a similar conceptualization of social capital would provide additional insights.

While it could be argued that this SASS dataset is not the most recent one, the current SASS dataset does not include several questions that this author felt more adequately captured the concept of social capital. While more analyses are planned using the 1999-2000 dataset, starting with the more comprehensive questionnaire was the more prudent course.

There may be serious issues with the categorical variable "secondary other" as this may have served as a catchall. The variable secondary other (n = 5,652) was more than the number of teachers in the areas of math and science combined, giving it an artificial importance. Subject areas classified as "other" most likely included gifted, innovative, alternative, and/or remedial programs that are non-special education. However, this inflated variable does not detract from the importance of the social capital variables.

The power of this conceptualization of social capital comes through strongly. One of the limitations is that the components of social capital (i.e., communication, trust and collegiality) are constrained by previously asked questions. It is this author's belief that future research with questions designed to more specifically and intentionally capture these concepts will have even more robust results.

Discussion

If burnout is the number one reason teachers leave the field (LeCompte & Dworkin, 1991), then increasing social capital may be highly effective at keeping teachers in the classroom and performing well. As this paper demonstrates, social capital is important to perceptions of professional control, especially over curricular decisions. Self-efficacy and burnout are related to how well teachers do their jobs and student performance (Bandura, 1993). Control appears to be closely linked with self-efficacy and burnout (Bandura), and the most powerful way to influence perceptions of control, at least as revealed in this study, appears to be by improving the effectiveness of communication and the amount of trust and collegiality within schools. Factors such as race, gender, and salary were not nearly as important to teachers' perceptions of curricular control as social capital. School relationships, then, hold considerable potential to influence teachers' attitudes toward their jobs, although more research would need to be done to establish a causal connection. Issues of perceived control have also clearly and consistently predicted future performance (Kanfer 1990; Miner 1980; Weiner 1985). Given that Croninger and Lee (2001) found that high levels of student-teacher social capital decreased drop out rates, it would not be surprising to find out that social capital also increases learning. These research results also suggest that further exploration into social capital's influence on teacher and student performance is warranted.

There are many areas relating to teacher and student performance that administrators cannot control, such as salaries, supplies, and class size, because of limited tax bases. However, principals and other leaders can begin the process of increasing perceived control and, potentially, self-efficacy through improving social capital. Especially noteworthy is that steps to begin increasing social capital would be far more cost effective than constructing new buildings, raising salaries, and lowering class

sizes. These other areas may still need to be addressed, but providing opportunities for teachers to meet and support one another, and refining interactions among teachers and between teachers and principals could be initiated quicker and more cheaply. For instance, one rationale for "team planning time" includes coordination between peers. This study indicates that communication, trust, collegiality and control are related, in which case, the nature and frequency of teacher-teacher interactions (such as team planning times) may be more important than generally realized. Further, increasing communication, trust and collegiality may well be ideally suited to clarifying norms and expectations, countering feelings of isolation, and, as this study has shown, decreasing feelings of powerlessness. According to LeCompte and Dworkin (1991), these actions can help alleviate or prevent feelings of burnout that affect longevity and performance on the job. Increasing social capital would, therefore, save money through increased performance as well as by decreasing the large expense of job searches and orientating new teachers.

Teachers in larger schools also felt less control across all four models, perhaps because teachers felt more demands upon their time. Interestingly, as the three components of social capital from this paper were included, the detrimental effects of enrollment decreased. The reduction in the negative effects of school size may occur because greater social capital provided teachers with additional resources for success. For example, more social capital may allow access to increased emotional support, access to professional guidance regarding how to better teach large classes, or even a willingness to provide coverage or team-teaching when teachers need a break. An implication of this finding is that increasing the social capital in large schools can potentially help increase perceptions of control among these teachers relative to their counterparts in smaller schools. These results also point to the advantages of small schools, where communication, trust and collegiality were more likely to develop. Bryk and Schneider (1996) found that smaller schools reported more trusting relationships among teachers and between teachers and parents. This study adds weight to the discussion on the potential importance of trust and other aspects of social capital in determining benefits of various categories of school size. However, with enrollment, as with urbanicity and minority composition of teachers and students, the coefficients remain negative, suggesting that social capital is a necessary but not sufficient force to compensate for systemic inequities.

The analyses also showed that social capital had stronger results for teacher perceptions of curricular control more than instructional control. This may indicate that curricular policies do, indeed, have an influence on classroom practices and that social capital helps teachers either meet or circumvent those demands. This dynamic lends implicit and expanded support to the research of Schwille et al. (1986), which concluded that all seven of the states they studied attempted some degree of curricular control. Clearly more direct explorations between state policies, social capital, and curricular control are warranted.

Overall, improving social capital seems likely to help keep teachers in the field of education, while at the same time facilitating their professional growth and improving student performance. In this era of increased accountability and dramatically tightening budgets, understanding factors that influence how teachers perceive their jobs has become critical. This study suggests that social relationships within an organization, as measured by communication, trust, and collegiality, can play a substantial role in enhancing teachers' perceptions of control over curricular decisions and may influence instructional control as well. The benefit of such deepening of our understanding of social capital and its influence on the learning process holds considerable potential.

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Endnotes

[1]Gluckman referred to this as multi-plexity (1967). I prefer the term multi-contextuality as it more precisely reflects the concept.

[2] Regression diagnostics revealed tolerance values all over .20. No variables have a VIF over 10. The VIF average (1.538) was not substantially greater than 1. Therefore, multicollinearity was most likely not an issue (Field, 2000, p. 153).

[3]Preliminary Hierarchical Linear Modeling (HLM) analyses were conducted to verify the regression results for the analyses described above, and the results were consistent with those presented here. The regression results were reported for parsimonious presentation.

[4]All the F-statistics for these regression models were highly statistically significant ($p<.001$), which is not surprising since at least one of the coefficients the model is statistically significant.

Appendix A

Factor analysis can create artificial groupings of variables. Therefore, the approach used here was used to examine patterns believed to be present. The factor analyses run were Principal Component (PC) Analysis and Maximum Likelihood Estimation (MLE) Analysis. Field (2000) recommended PC over factor analysis, and MLE was recommended for generalizations to populations. MLE and PC results were almost identical, and MLE results are reported here.

The factor correlation matrix revealed correlations were present, hence requiring oblique rotation (Field, 2000). The "pattern" results show the groupings more clearly. The "structure" results show any mixed loading of factors. The coefficients for curricular control ranged from .531 to .761 (pattern) and .574 to .747 (structure). Instructional control ranged from .614 to .752 (pattern) and .617 to .746. (structure). Communication coefficients ranged from .520 to .859 (pattern) and .578 to .794 (structure), with the exception of one variable that was .001 (pattern) and .154 (structure). Deleting this variable had a negligible effect on the alpha coefficient, and had the benefit of including communication between teachers, so the variable was kept in the scale. Trust factor coefficients ranged from .571 .783 (pattern) and .482 to .774 (structure), with one variable at .005 and .280, respectively. Collegiality results ranged from .109 to .743 (pattern) and .288 and .699 (structure). Variables that held coefficients under .40 were only kept in the scale if removing the item also lowered the alpha coefficient.

Appendix B
Control Over Curriculum Decisions, Standardized Beta Coefficients, Weighted
Model 4, All Social Capital Variables, With Partial Correlations

	Model 4	Partials
Enrollment	-0.066***	-0.064
Urban	-0.081***	-0.072
Suburban	-0.088***	-0.083
% Minority Teachers	-0.057***	-0.040
% Minority Enrollment	-0.050***	-0.037
Subject: Elementary Other	0.130***	0.136
Subject: Elementary Special Ed.	0.106***	0.114
Subject: Secondary Other	0.259***	0.245
Subject: Secondary Special Ed.	0.155***	0.164
Subject: English	0.137***	0.143
Subject: Mathematics	0.061***	0.063
Subject: Science	0.111***	0.115
Subject: Social Studies	0.107***	0.108
Subject: Vocational/Technical	0.177***	0.184
Number of Children	-0.003	-0.003
Divorced, Widowed, Separated	-0.008	-0.008
Never Married	-0.019***	-0.019
American Indian	0.007	0.008
Asian	0.046***	0.052
Black	0.015**	0.015
Hispanic	0.034***	0.036
Male	0.024***	0.024
Base Salary	0.059***	0.050
Age	-0.083***	-0.062
Total Experience	0.025**	0.017
Highest Degree	-0.015**	-0.016
New Teacher	-0.022***	-0.022
Communication	-0.004	-0.003
Trust	0.122***	0.081
Collegiality	0.246***	0.191
Adjusted R^2	.221	

SOURCE: The 1993 School and Staffing Survey, Public Use Data, Provided by the National Center for Education Statistics
*** Significant at the 0.001 level (2-tailed).
** Significant at the 0.01 level (2-tailed).
* Significant at the 0.05 level (2-tailed).

Appendix C
Control Over Instructional Decisions, Standardized Beta Coefficients, Weighted
Model 4, All Social Capital Variables, With Partial Correlations

	Model 4	Partials
Enrollment	0.008	0.007
Urban	-0.026***	-0.022
Suburban	-0.033***	-0.029
% Minority Teachers	-0.004	-0.003
% Minority Enrollment	-0.006	-0.004
Subject: Elementary Other	0.033***	0.033
Subject: Elementary Special Ed.	0.031***	0.032
Subject: Secondary Other	0.163***	0.147
Subject: Secondary Special Ed.	0.088***	0.088
Subject: English	0.103***	0.100
Subject: Mathematics	0.082***	0.080
Subject: Science	0.095***	0.092
Subject: Social Studies	0.096***	0.091
Subject: Vocational/Technical	0.106***	0.104
Number of Children	0.013*	0.012
Divorced, Widowed, Separated	-0.004	-0.004
Never Married	-0.021***	-0.019
American Indian	0.001	0.001
Asian	0.017***	0.018
Black	0.022***	0.021
Hispanic	0.005	0.005
Male	-0.021***	-0.020
Base Salary	0.025***	0.020
Age	-0.067***	-0.047
Total Experience	-0.006	-0.004
Highest Degree	-0.006	-0.006
New Teacher	-0.012*	-0.011
Communication	-0.09***	-0.059
Trust	0.191***	0.118
Collegiality	0.191***	0.139
Adjusted R^2	.104	

SOURCE: *The 1993 School and Staffing Survey*, Public Use Data, Provided by the National Center for Education Statistics
*** Significant at the 0.001 level (2-tailed).
** Significant at the 0.01 level (2-tailed).
* Significant at the 0.05 level (2-tailed).

Initial Construct Validation of the Teacher High-stakes Testing Scale

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The purpose of this study was to develop and initially validate an instrument for measuring teachers' perceptions of high-stakes testing. Data were gathered from a large sample across a high-stakes testing state on items that measured teachers' perceptions of standards-based testing. The Teacher High-Stakes Testing Scale's (THSTS) development, reliability, construct validity, and utility in detecting group differences in scores is discussed. Exploratory factor analysis supported the 'motivation and morale,' 'instructional support,' and 'instructional impact' domains derived from the literature and the instrument was sensitive to detecting group differences on several demographic variables. The THSTS's potential uses for impacting high-stakes testing research are discussed.

Passage of the No Child Left Behind (NCLB) Act has brought testing and accountability to the forefront in American schools, and as a result there has been a dramatic increase in the level of statewide high-stakes testing (Gulik, 2003). High-stakes testing has emerged as a tool for accountability in schools across the country and nearly all states have statewide assessment programs (Abrams, Pedulla, & Madaus, 2003; McNeil, 2000). Whereas the emphasis in learning in the 1980s was on minimum competency testing and during the 1990s higher-order thinking, there is now a shift to learning being tied to standards and accountability at the national level (Sloane & Kelly, 2003). The shift to the national level for accountability partially resulted from the Third International Mathematics and Science Study (TIMSS; Schmidt, McKnight, & Raizen, 1997), and from the pre-existing state-level testing of student performance that most noticeably started with mathematics (National Council of Teachers of Mathematics [NCTM], 1989; Sloane & Kelly, 2003). There is no national test yet, but rather a mandate, in that NCLB national testing legislation leaves the format up to the individual states (Sloane & Kelly).

All 50 states have implemented accountability initiatives related to setting common standards that measure performance and link to student outcomes. Policymakers are now using the data from large-scale assessments that are linked to standards to make accountability decisions for students, teachers, schools, and school districts. Title I legislation has also done much to increase the frequency of large-scale testing by mandating that assessments given be aligned with state standards in reading and mathematics in one grade per grade level (elementary, middle, and high school), and to use the data to track performance and identify critically low-performing schools. Title I has now expanded state testing to include Grades 3 through 8 in reading and mathematics by the 2005-2006 school year and science by 2007-2008. Student performance on these assessments, which are linked to state standards, has become the primary measure of accountability with the goal of

all students meeting state proficiency levels by 2013-2014 (Goertz & Duffy, 2003). As a result, many states tie the assessment results to a guarantee of rewards (e.g., bonuses for teachers or schools) or a threat of sanctions (e.g., transferring to other public schools, converting public schools to charter schools, being taken over by the district or state). Some view such acts as a means to promote quality teaching and higher student achievement, while others view them as a means to limit the scope of classroom instruction and student learning (Stecher & Barron, 1999; Stecher, Barron, Chun, & Ross, 2000).

Statewide tests vary in form, mainly mathematics and reading tests that are a combination of criterion- and norm-referenced tests; and function, with accountability in its most basic form ranging from broad public reporting to specifics such as building district or school improvement plans (Goertz & Duffy, 2003). The frequency of testing also ranges from once in elementary, middle, or high school to almost every grade. Although some states incorporate open-ended questions and portfolio assessments (Kentucky and Vermont), and many use extended response items in English (written paragraphs), multiple-choice items still dominate (Goertz & Duffy; Gulek, 2003; *Quality Counts*, 2002).

Regardless of form or function, testing has resulted in varying the "stakes" from high to low state-to-state in terms of the impact on students and individual schools. "High-stakes" has been defined as using test results to make highly consequential decisions at the school or student level, such as student diagnosis or placement, student promotion, high school graduation, school performance accountability, or providing awards or imposing sanctions (Abrams, Pedulla, & Madaus, 2003; Goertz & Duffy, 2003; Heubart & Hausser, 1999). Furthermore, some states hold students accountable for performance and not necessarily their schools (Goertz & Duffy). "Low-stakes" has been defined as states with testing programs that did not have any known consequences attached to schools or students (Abrams, Pedulla, & Madaus, 2003). Most states direct rewards or sanctions toward the schools by requiring them to develop school improvement plans that address weaknesses and foster change, but more and more states that have been defined as low-stakes are becoming high-stakes by imposing more accountability for students.

The Improving America's School's Act (IASA) has called for states to establish at least three levels of student performance (advanced, proficient, basic) and to set student performance goals. Goals varied in terms of the expected level of student performance (e.g., which test cut scores defined the three levels), the percentage of students that had to meet standards, and the length of time the school had to meet its goals. IASA goes further in that once the states have established performance goals they must define how they will measure annual progress that is "substantial and continuous." School progress was usually measured by achieving a performance threshold (absolute target), meeting annual growth based on the school's past performance and its distance from state goals (relative growth), or reducing the number or percentage of students scoring at the lowest levels (achievement gap). Student progress was usually measured by incorporating test scores into promotion from grade-to-grade and high school graduation (Goertz & Duffy, 2003).

Even though previous research has uncovered both positive and negative consequences of high-stakes testing (Abrams, Pedulla, & Madaus, 2003; McColskey & McMunn, 2000), it appears that it is here to stay for awhile. Positive consequences include raising academic performance and narrowing the performance gap between White students and students of color (Grissmer & Flanagan, 1998; Grissmer, Flanagan, Kawata, & Williamson, 2000). Well-developed state standards and performance-based accountability systems have also provided a clear focus to districts and schools regarding student outcomes and have created incentives for school improvement (Goertz, 2001; Massell, 2001). The response has been to set clear expectations for student performance; and to guide curriculum development, school improvement planning, and professional development. Negative consequences include discrimination against poor and minority students, narrowing of the curriculum, and limiting teacher flexibility and creativity (McNeil, 2000). There have also been concerns regarding such issues as teacher morale, student motivation and morale, the impact on classroom practices, and the use of a single high-

stakes test when making accountability decisions (Abrams, Pedulla, & Madaus, 2003; Goertz & Duffy, 2003; Gulek, 2003; Jones et al., 1999; Sloane & Kelly, 2003).

The Impact of the Florida Comprehensive Assessment Test

In response to accountability initiatives, in the early 1970s the Florida Commission on Education Reform and Accountability recommended procedures for assessing student learning that would raise educational expectations for students and help them compete for jobs; and requested that educational content standards be developed and adopted. As a result, the State Board of Education adopted the commission's recommendations and the Florida Legislature implemented statewide assessment of students in Grades 3, 5, 8, and 11 (www.firn.edu/doe). During the 1990s, these recommendations were henceforth referred to as the Comprehensive Assessment Design and were expanded so that students would be tested in reading, writing, mathematics, and creative and critical thinking. The Commission also requested that educational content standards be developed and adopted and as a result the State Board of Education developed the Sunshine State Standards, which measured what students should know and be able to do at each grade level, and were subdivided into *benchmarks*. As a result of the Sunshine State Standards and the resulting benchmarks, the Florida Comprehensive Assessment Test (FCAT) was designed to assess student achievement in reading and mathematics (Grades 3-10), science (Grades 5, 8, and 10) and writing (Grades 4, 8, and 10; http://firn.edu/doe/sas/fcat.htm). The FCAT has two basic components: a criterion-referenced test, which measures these areas according to the Sunshine State Standards; and a norm-referenced test, which measures students' performance against national norms.

As in most states that have high-stakes testing, consequences exist for both schools and students that are linked to the FCAT results. In 1999, the Florida legislature mandated that schools would be assigned a performance grade of "A" (making excellent progress) to "F" (failing to make adequate progress) based partly on FCAT scores. For the years 2001-2002, each school's performance grade was partially based on student learning gains on the FCAT, and other data including attendance, dropout rate, school discipline data, cohort graduation rate, and student readiness for college.

Schools that received a grade of A or had improved at least two performance grade categories had greater autonomy, which included authority over the school's budget (Florida Statutes Ch. 99.398, p. 36). In addition, these schools were eligible for the Florida School Recognition Program, which was designed to provide financial awards of which a school's staff and advisory council could determine usage. Schools designated as performance grade category "D" or "F" were eligible to receive assistance and intervention in an effort to improve performance (Florida Statutes Ch. 99.398, p. 28); however, action could be taken if the school did not improve. Students in any of the schools that received a grade of "F" for two consecutive years were eligible for a state voucher (opportunity grant), which allowed them to attend a higher performing school in the same district, an adjoining district, or a private school. Consequences were also directly tied to the students; starting in 2002-2003 a regular high school diploma would not be awarded to those who did not pass the FCAT in Grade 10.

Teacher Attitudes toward High-stakes Testing

Although much research has been conducted in the area of high-stakes testing, particularly in terms of positive or negative consequences for students and school-based administrators, teachers themselves need to actively engage in the debate and their attitudes need to be examined. Current research on teachers' perceptions of state testing programs is scant, but is organized around four areas: the impact on classroom instruction in terms of content and delivery; the pressure to prepare students for testing; the impact on teacher and student motivation and morale; and views of accountability (Abrams, Pedulla, & Madaus, 2003).

Results indicate that teachers give greater attention to tested content areas and de-emphasize or neglect untested subject areas (Koretz, Barron, Mitchell, & Stecher, 1996). The impact on instructional strategies is less clear, and there tends to be a greater impact on the content and pace of instruction rather than on the mode of instruction

(McMillan, Myran, & Workman, 1999). Teachers also spend more classroom time preparing students specifically for the high-stakes tests because they felt more pressure to improve student performance (Koretz, Mitchell, Barron, & Keith, 1996). The most common activities included training students to mark answer sheets correctly, providing test-taking tips, improving test-taking skills, reviewing or teaching for the test, and using commercial test-preparation materials and prior tests for practice (Hoffman, Assaf, & Paris, 2001).

Although intended to motivate, high-stakes tests can have detrimental effects such as reducing instruction to test preparation, and as a result, limiting the range of educational experiences for students and reducing the skills teachers bring to their profession (McNeil, 2000). Studies have indicated that high-stakes tests increase stress and decrease morale to the point that many have chosen to leave the profession (Hoffman et al., 2002). Similar impacts have been found regarding students who also report higher levels of test-induced anxiety, stress, and fatigue; although it is not clear if anxiety is due to the tests themselves, or inadequate preparation for learning (Sloane & Kelly, 2003). Of greater concern in terms of students is that external motivating forces or rewards or sanctions may have a minimal effect (Kellaghan, Madaus, & Raczek, 1996), and for those who view passing the test as beyond their means may give up and drop out of school (Haney, 2000; Reardon, 1996).

Some studies have examined teacher views of testing for accountability. Many teachers believed that accountability programs would not improve the quality of education in their state (Jones et al., 1999); however, the perceptions of stakes attached to the test results vary among teachers in the same state (Firestone, Mayrowetz, & Fairman, 1998). Few teachers question the need for high standards and the linkage to student progress, but do question the sanctions attached to test results and whether additional indicators should be used for accountability (Linn, 2000).

As stated earlier, even though nearly all states have statewide assessment programs that are grounded in educational reform (McNeil, 2000), little research has been conducted that explores the impact testing has on the attitudes and perceptions of teachers. It is teachers themselves that directly influence whether external reform initiatives are implemented in the classroom; thus, impacting the instructional process and student achievement. If educational reform is to be successful, then teachers' views should be more closely examined since they are the ones whose primary responsibility it is to initiate reform. Much of the research to date involving teacher attitudes and perceptions regarding high-stakes testing has been done within the various states; yet many of the instruments used do not clearly define what is being measured. It was stated earlier that state standards and accountability systems have provided a clear focus to districts and schools regarding student outcomes and school improvement (Goertz, 2001; Massell, 2001), and an instrument that measures teachers' perceptions could aid principals in how to guide curriculum development, school improvement planning, and professional development so as to not limit teacher flexibility and creativity (McNeil, 2000), yet still impact classroom practice in a positive way (Abrams, Pedulla, & Madaus, 2003). A well-defined measure of teachers' perceptions of high-stakes testing would not only aid researchers and school personnel in examining the effects of various school reform initiatives, but could further aid principals in identifying teachers who have had their motivation and morale decreased to the point that they may want to leave the profession and can then intervene (Hoffman et al.); therefore, the purpose of this study was to develop and initially validate an appropriate instrument for measuring these perceptions.

Method

Participants and Procedure

At the time of this study there were 146,853 teachers listed in the state of Florida of which many were eliminated because there were many certifications that did not have a direct instructional link to the FCAT (e.g., guidance counselors, occupational specialists, music, art, etc.). The state database was refined to obtain a representative sample of 95,670 teachers for the purpose of the survey, and from this number a simple random sample of 10,000 teachers was selected (10.5%). The survey was mailed via regular mail to 5,000 teachers prior to and after the week of FCAT testing, respectively, in order to

counterbalance for any order effect and responses were obtained from 2,363 teachers (24%). Of the 2,363 respondents, a majority of the teachers had taught more than 11 years (57%), represented all instructional levels (46% were elementary, 26% were middle, 27% were high school, and 1% other), were mainly urban (72%), were predominately female (80%), were certified and teaching in-field (96%), and had obtained their certification via traditional training (82%; i.e., a teacher certification program from a university that included student teaching).

Instrumentation

In order to adequately describe the sample, demographic variables of interest were included on the cover sheet of the Teacher High-Stakes Testing Scale (THSTS). An initial pool of 52 items was designed to measure teachers' perceptions concerning several instructional and attitudinal aspects of high-stakes testing. Current research revealed that teachers' perceptions of state testing programs were organized around four areas: the impact on classroom instruction, the pressure to prepare students, the impact on motivation and morale, and accountability (Abrams, Pedulla, & Madaus, 2003); however, it can be argued that the pressure to prepare students for testing is actually one aspect of motivation and morale. This literature was used for the logical derivation of the THSTS items and a review for content validity was completed by the authors who have expertise in measurement and educational administration, and corrections were made for clarity.

Fourteen items inquired into the instructional aspects and included curriculum impact (e.g., As a result of the FCAT, I have had to change my curriculum to align with the FCAT test), staff development (e.g., There has been increased staff development in my school/district on the Sunshine State Standards), classroom instructional impact (e.g., I spend most of my instructional time in preparing for the FCAT), and school instructional impact (e.g., My school provides remediation for students who score below grade level on the FCAT). Twenty-seven items inquired into several attitudinal aspects and included incentives (e.g., Teachers should receive bonuses/incentives for increased student achievement on the FCAT), morale (e.g., Teachers should be penalized if students do not achieve on the FCAT), teacher motivation (e.g., FCAT testing has motivated me to do a better job as a teacher), satisfaction (e.g., My school celebrates success on the FCAT), and administrative support (e.g., I receive support from the district office for the FCAT). The remaining 11 items inquired into aspects of accountability and included teacher and student accountability (e.g., My students' performance on the FCAT is a good indicator of my teaching ability) and school improvement (e.g., As a result of FCAT testing, teachers are more able to communicate the SSS to others). Participants responded to the items using a modified Likert-type scale that ranged from 1 (*strongly disagree*) to 4 (*strongly agree*); a 4-point scale was selected to eliminate neutrality, and items were stated positively to reflect high scores on the attribute.

Data Analysis

For the final version of the instrument, it was expected that the scores would yield high internal consistency reliability (Cronbach's coefficient alpha). Exploratory factor analysis (rather than confirmatory factor analysis) with oblique rotation was used because correlations among the factors were expected; and because the items were developed to correspond to the three domains identified in the literature, an additional intent of using exploratory factor analysis was to determine if these same factors would emerge without being forced. In order to provide further validation evidence, additional multivariate analyses of variance were conducted using a composite score formed from the factors that emerged from the THSTS as a dependent variable and several of the demographic variables as independent variables (gender, years of teaching experience, type of school, level of education, letter grade assigned to school) in order to determine the sensitivity of the instrument in detecting group differences. It was expected that there would be no significant differences in the scores based on gender, years of teaching experience, and level of education as the examination of the literature provided no reason to

expect differences on these variables. It was expected, however, that there would be significant differences in the scores based on type of school and letter grade assigned to the school as it was hypothesized that elementary teachers, because every grade is tested, would perceive a greater need to change their instruction to align with the test. It was also hypothesized that teachers who work in a school that was assigned a higher grade would have significantly higher motivation subscale scores than teachers who work in a school that was assigned a low grade. Statistical assumptions (e.g., linearity, univariate and multivariate outliers) that are pertinent to either the factor analysis or multivariate analyses of variance were examined.

Results

Factor Structure of the THSTS Scores

We examined several statistical assumptions prior to the exploratory factor analysis. Examination of bivariate scatterplots between several of the THSTS items revealed linear relationships and item-total correlations ranged from .37 to .69. When each of the subscales was examined, there were several univariate outliers that were detected and deleted from further analyses, and there were no multivariate outliers. The maximum number of factors to be extracted, in an initial examination of the data, was determined using Velicer's MAP test and parallel analysis. Velicer's MAP test and parallel analysis usually result in the same decision regarding the number of factors to retain; however, researchers have been encouraged to run both tests as identical results are not always produced (O'Connor, 2000; Zwick & Velicer, 1986). Velicer's MAP test yielded eigenvalues of 9.50, 4.31, and 2.69 and indicated that three factors should have been retained. Parallel analysis, which extracted eigenvalues from random data sets that paralleled the actual data set in terms of number of variables and cases, also yielded eigenvalues that indicated that three factors should be retained.

Exploratory factor analysis was performed on the 52 items using principal axis factoring with promax rotation since it was expected that the factors would correlate. Several examinations of the data resulted in a series of item deletions in order to refine the items to obtain the best model possible and the final version of the instrument yielded 28 items. Correlations between two of the factors were somewhat substantial (motivation/morale and instructional support, r = .30; instructional support and instructional impact, r = .18; motivation/morale and instructional impact, r = .02), which provided some support that the subscales would relate to each other. The first factor accounted for 22.86%, the second factor 10.36%, and the third factor 6.75% of the total variance, respectively. Examination of the factor pattern and structure coefficients indicated that the three factors that emerged were "motivation and morale" (17 items), "instructional support," (8 items), and "instructional impact" (3 items), and all of the items had at least 20% shared variance (loadings greater than .40) with their respective factors and no items were complex.

Table 1 also contains item means and standard deviations of the items, which revealed that for at least half of the items the responses of the teachers were favorable. The highest means were in the instructional support and instructional impact domains, and mainly reflected favorable attitudes toward the school administration, staff development, and changing teaching methods. The lowest means were in the motivation and morale domain, and mainly reflected unfavorable attitudes toward penalization and staying in the teaching profession.

Table 1

Means and Standard Deviations, Corrected Item-Total Correlations, and Promax (Kappa=4) Factor Structure and Pattern Coefficients for THSTS Items

				Factor 1		*Factor 2*		*Factor 3*	
	M	*SD*	*r*	*Pattern*	*Structure*	*Pattern*	*Structure*	*Pattern*	*Structure*
Motivation and Morale									
FCAT testing has given me a new, positive purpose for teaching.	1.61	0.72	.67	.73	.72	-.03	.14	-.06	-.11
FCAT testing is a highly motivating function of my job as a teacher.	1.76	0.76	.65	.73	.70	-.06	.14	.08	.03
FCAT testing has motivated me to do a better job as a teacher.	2.01	0.81	.66	.71	.71	-.01	.19	.08	.04
The FCAT enhances student achievement.	1.89	0.74	.66	.69	.71	.06	.22	-.09	-.12
The FCAT enhances students' motivation to learn.	1.72	0.72	.62	.67	.68	.01	.16	-.11	-.15
FCAT testing has made teaching more attractive to me as a long term career.	1.37	0.59	.58	.66	.64	-.10	.05	-.11	-.17
I feel valued and respected when my students do well on the FCAT.	2.52	0.81	.58	.58	.60	.09	.27	-.16	.14
FCAT testing has resulted in more accurate program placement.	2.13	0.73	.56	.56	.59	.12	.26	-.04	-.05
Schools should receive bonuses/incentives for increased student achievement on the FCAT.	2.37	1.07	.56	.59	.59	-.01	.17	.12	.09
My students' performance on the FCAT is a good indicator of my teaching ability.	1.77	0.79	.54	.53	.56	.08	.21	-.05	-.07
Schools should be penalized if students do not achieve on the FCAT.	1.44	0.62	.48	.55	.54	-.10	-.01	-.30	-.35
Teachers should receive bonuses/incentives for increased student achievement on the FCAT.	2.23	1.06	.53	.58	.56	-.04	.14	.17	.12
As a result of FCAT testing, teachers are more able to communicate the SSS to others.	2.30	0.71	.52	.52	.55	.16	.30	.06	.06
Teachers should be penalized if students do not achieve on the FCAT.	1.36	0.56	.46	.53	.52	-.10	-.01	-.26	-.31
FCAT testing is a true measure of "everything students have learned."	1.43	0.65	.46	.50	.49	-.05	.06	-.11	-.15
I use the results of the FCAT to improve my instruction.	2.52	0.80	.48	.50	.51	.09	.26	.24	.22
I am confident that my students will succeed on the FCAT because of my abilities as a teacher.	2.60	0.82	.43	.42	.44	.10	.23	.11	.11
Instructional Support									
At my school, the administration provides support concerning the FCAT (e.g., instructional materials, professional development, and environment conducive to testing).	3.32	0.66	.55	-.04	.13	.65	.64	-.02	.09
At my school, the administration notifies me in a timely manner as to when the test is going to be given.	3.56	0.59	.46	-.12	.03	.59	.56	.01	.11
There has been increased staff development in my school/district on identifying effective strategies to increase student achievement.	3.18	0.72	.54	.05	.21	.61	.62	-.03	.07
There has been increased staff development in my school/district on the Sunshine State Standards.	2.91	0.77	.49	.13	.27	.54	.58	.03	.11
My school provides remediation for students who score below grade level on the FCAT.	3.46	0.65	.41	-.02	.11	.48	.47	-.05	.03
There has been *sufficient* formal training on FCAT test administration in my school/district.	3.07	0.75	.40	-.04	.09	.47	.45	-.07	.01
I receive support from the district office for the FCAT.	2.70	0.83	.43	.10	.23	.48	.49	-.09	-.01
My school celebrates success on the FCAT.	3.07	0.72	.37	.10	.20	.40	.43	.04	.10
Instructional Impact									
As a result of the FCAT, I have had to change my curriculum to align with the FCAT test.	2.94	0.81	.69	.01	-.06	-.08	.04	.74	.72
I spend most of my instructional time in preparing for the FCAT.	2.62	0.89	.59	.09	.04	-.04	.10	.67	.66
I have had to change my teaching methods as a result of the FCAT (e.g., test-taking strategies, textbook alignment to the standards).	3.02	0.79	.61	-.03	-.08	-.03	.07	.67	.67
Percent of Variance				22.86		10.36		6.75	
Percent of Covariance				57.19		25.92		16.89	

Internal Consistency Reliability

Internal consistency reliability of the THSTS subscales and total scores was determined using the Cronbach alpha internal consistency coefficient (corrected item-total correlations are provided in Table 1). Because the exploratory standard for instrument development is often noted as .70 (Nunnally as cited in Henson, 2001), and it is often accepted that .80 is adequate for general research purposes (Loo, 2001), the reliability of the scores for the total THSTS was determined to be adequate for the 28 refined items (α = .86). The reliability of the scores for the motivation and morale subscale was α = .90, for the instructional support subscale α = .76, and for the instructional impact subscale α = .79. Reliability of the scores of two of the subscales was below the standard for general research purposes; however, these subscales contained fewer items, and were still above the instrument development standard. Results of this study indicate that the internal consistency reliability of the total scale scores was adequate for general research purposes, yet only two of the three subscale score reliabilities were acceptable. It is recommended that the subscales be used collectively due to the low reliability of the instructional support subscale and the inter-factor correlations.

THSTS Sensitivity to Group Differences

A composite score was formed from the three domains to serve as the dependent variable with gender, years of teaching experience (0-1, 2-5, 6-10, 11+), type of school (elementary, middle, high), level of education (bachelors, masters, specialist, or doctorate), and the letter grade assigned to the school (A, B, C, D, or F) as independent variables. The range of raw scores possible was 17 to 68 for the motivation/morale subscale, 8 to 32 for the instructional support subscale, and 3 to 12 for the instructional impact subscale. As stated earlier, it was expected that there would be no significant differences in the scores based on gender, years of teaching experience, and level of education, but significant differences in the scores based on type of school and letter grade assigned to the school.

Statistical assumptions examined included normality of the subscales and the homogeneity of the variance/covariance matrices. Normality of the subscales was examined via Shapiro-Wilk and the assumption was violated for all of the scores; yet examinations of the box and whisker plots revealed that very little visual skewness was present in the data and the violations were probably due to the large sample size. Homogeneity of the variance/covariance matrices via Box's M across several of the demographics indicated that the equal variance assumption was also met.Statistically significant differences were observed for gender, years of teaching experience, type of school, and assigned school grade, but not level of education for the omnibus multivariate tests [$F(3,2329) = 21.05$, $p < .001$; $F(9,5712) = 6.23$, $p < .001$; $F(6,4634) = 34.97$, $p < .001$; $F(9, 5530) = 4.56$, $p < .001$, $F(6,4318) = 0.84$, $p > .05$; respectively]. Follow-up analyses were conducted for gender, years of teaching experience, type of school, and assigned school grade on a composite score that was created by first standardizing the three scores (using each grand mean and pooled standard deviation), and then weighting the standardized scores by the standardized discriminant function weights (obtained via descriptive discriminant analysis). The resulting composite was then examined via univariate analysis of variance with pairwise contrasts because the omnibus multivariate test was of interest, and so that the composite score would be consistent across the variables examined (Enders, 2003).

The follow-up analysis for gender revealed a statistically significant difference on the composite score [$F(1,2331) = 63.20$, $p < .001$], yet the effect size was small ($\eta^2 = .03$; Table 2). An examination of the structure coefficients indicated that the higher centroid for the females was associated with higher scores on the composite, particularly the instructional impact component. For years of teaching experience, the follow-up analysis revealed a statistically significant difference on the composite score [$F(3,2349) = 17.90$, $p < .001$], and pairwise contrasts indicated a statistically significant difference between teachers who taught 0-1 years and those who taught 6-10 and 11+ years, teachers who taught 2-5 years and those who taught 6-10 and 11+ years, and teachers who taught 6-10 and 11+ years, and again the effect size was small ($\eta^2 = .02$). An examination of the structure coefficients indicated that the higher centroid for those who had the fewest years of

teaching experience was associated with higher scores on the motivation and morale component and lower scores on the instructional support component of the composite score. For type of school, the follow-up analysis revealed a statistically significant difference on the composite score [$F(2,2319) = 98.71, p < .001$], and pairwise contrasts indicated a statistically significant difference between all of the levels of school, but again the effect size was small ($\eta^2 = .08$). An examination of the structure coefficients indicated that the higher centroid for elementary teachers was associated with higher scores on the instructional impact component of the composite score. For assigned school grade, the follow-up analysis revealed a statistically significant difference on the composite score [$F(3,2274) = 9.85, p < .001$], and pairwise contrasts indicated a statistically significant difference between schools assigned a grade of A and all other grades, and the effect size was small ($\eta^2 = .01$). An examination of the structure coefficients indicated that the higher centroid for those who taught in a school that was assigned a grade of D or F was associated with lower scores on the instructional support and the motivation/morale component of the composite score.

Table 2

Composite Variable Centroids and LDF Weights for Motivation/Morale, Instructional Support, and Instructional Impact Scores by Gender, Years of Teaching Experience, Type of School, and Assigned School Grade

Effect	Structure *r*	Std. Weight		Centroid
Gender				
Motivation/morale	.06	-.02	Male	-.33
Instructional support	.41	.37	Female	.08
Instructional impact	.93	.92		
Years of teaching experience				
Motivation/morale	.62	.86	0-1	.30
Instructional support	-.56	-.81	2-5	.22
Instructional impact	-.17	-.10	6-10	.05
Type of school			11+	-.12
Motivation/morale	.13	.11	Elementary	.31
Instructional support	.26	.19	Middle	-.14
Instructional impact	.97	.97	High	-.36
Assigned school grade				
Motivation/morale	-.75	-.56	A	-.12
Instructional support	-.79	-.65	B	.05
Instructional impact	.26	.27	C	.14
			D or F	.16

Examination of the means and standard deviations from Table 3 revealed that females had higher scores on all three subscales. Teachers who had the fewest years of teaching experience had the highest motivation and morale scores, but the most experienced teachers had the highest instructional support and instructional impact scores. Middle school teachers had the highest motivation and morale scores, but elementary teachers had the highest instructional support and instructional impact scores. Also, teachers who taught in a school that was assigned a grade of A had the highest motivation and morale scores and instructional support scores, but those who taught in a school assigned a D or F had the highest instructional impact scores. Even though statistically significant differences were found on the composite score by gender, years of teaching experience, type of school, and assigned school grade, the effect sizes were generally small.

Table 3

Means and Standard Deviations of Motivation/Morale, Instructional Support, and Instructional Impact Scores by Gender, Years of Teaching Experience, Type of School, and Assigned School Grade

		Motivation/ morale		Instructional support		Instructional impact	
Grouping Variable	*n*	*Mean*	*SD*	*Mean*	*SD*	*Mean*	*SD*
Gender							
Female	1873	33.15	7.94	25.42	3.41	8.76	2.05
Male	460	32.88	8.37	24.85	3.62	7.94	2.09
Years of teaching experience							
0-1[a]	129	34.76	7.81	24.70	3.96	8.54	1.85
2-5[b]	447	34.38	7.61	24.95	3.48	8.59	2.12
6-10[c]	438	33.37	8.40	25.24	3.41	8.46	1.97
11+	1339	32.43	7.98	25.51	3.41	8.65	2.19
Type of school							
Elementary	1061	33.19	7.80	25.58	3.40	9.18	1.98
Middle	593	34.04	8.52	25.24	3.53	8.27	2.00
High	668	32.06	7.81	24.92	3.47	7.92	2.06
Level of education							
Bachelors	1265	33.31	7.95	25.27	3.50	8.66	2.07
Masters	959	32.54	8.11	25.24	3.44	8.50	2.10
Specialist or doctorate	117	34.37	8.80	25.78	3.51	8.42	2.20
Assigned school grade							
A[d]	1074	33.83	8.14	25.61	3.35	8.57	2.09
B	549	32.58	7.92	25.15	3.40	8.57	2.09
C	502	32.08	7.97	24.97	3.68	8.53	2.01
D or F	153	33.09	7.18	24.85	3.51	9.06	2.03

Note. [a] significantly different from 6-10 and 11+ on composite score.
[b] significantly different from 6-10 and 11+ on composite score.
[c] significantly different from 11+ on composite score.
[d] significantly different from all other grades on composite score

Conclusions

The results of this study provide initial support for the reliability and validity of the scores from the literature-based constructs that were measured. Reliability of the total THSTS scale scores was adequate for general research purposes, and all of the three subscale score reliability coefficients were above the standard for instrument development. The lowest reliability coefficient was associated with the "instructional support" subscale scores, yet it was interesting to note that the subscale with the fewest items, "instructional impact," had a higher internal consistency coefficient. As mentioned earlier, it is recommended that total scores be used instead of the subscale scores due to the low reliability of the instructional support subscale and the inter-factor correlations, and future research will include adding additional items to the instructional support and impact subscales in order to improve their internal consistency.

The results of the exploratory factor analysis were encouraging because three strong constructs did emerge; motivation and morale, instructional support, and instructional impact; and no items were complex and associated with another factor. Results of this study also indicate variability in the responses across the items, which may indicate that the participants did react to each item separately and gave careful consideration to their responses. It was not surprising, however, that the items with the lowest means were those that related to motivation and morale, particularly the unfavorable attitudes toward penalization or staying in the teaching profession. It was encouraging to find, however, that the highest means were associated with favorable attitudes toward the administration, staff development, and changing teaching methods, which may indicate that the FCAT is having a positive impact on attitudes relating to administrative support and instructional change.

In an attempt to gain even further evidence of the validity of the THSTS scores, additional analyses were performed using several of the demographic variables as independent variables and a composite score formed from the subscales of the THSTS as a dependent variable. Of particular interest was gender, years of teaching experience, type of school, level of education, and the letter grade assigned to the school. It was expected that there would be no differences on the THSTS scores by gender, level of education, or years of teaching experience since there was no a priori reason to expect differences, yet it was determined that female teachers had slightly higher scores overall than males. Also, younger teachers had higher motivation/morale but lower instructional support scores than more experienced teachers. The hypothesis was supported that there would be no difference in the scores based on education.

It was hypothesized that elementary teachers would perceive a greater need to change their instruction to align with the standardized test, and this hypothesis was supported as elementary teachers did have the highest instructional impact scores. It was also hypothesized that teachers who work in a school that was assigned a higher grade would have higher motivation scores than teachers who worked in a school that was assigned a lower grade, and this hypothesis was supported as those teachers who worked in a school assigned a grade of A did have higher motivation/morale scores than the other groups. It was interesting to note that those teachers who worked in a school assigned a grade of D or F had higher instructional impact scores, which may provide evidence that these teachers have responded by making changes at the classroom level in order to impact their students' performance on the test.

Discussion

Foremost, this study did contribute to the knowledge base examining teachers' attitudes toward high-stakes testing as the current literature did provide a basis for item development (impact on classroom instruction, motivation and morale, and views of accountability; Abrams, Pedulla, & Madaus, 2003). The results of this study support the previous findings mentioned in the literature that teachers give greater attention to tested content areas and de-emphasize or neglect untested subject areas as evidenced by the items that measured instructional impact having the highest mean scores (Koretz, Barron, Mitchell, & Stecher, 1996). The teachers in this study indicated they did change their curriculum to align with the test, did

spend most of their instructional time in preparing for the test, and changed their teaching methods as a result.

Also supported in this study is the notion that high-stakes tests have detrimental effects on teachers' attitudes such as decreasing morale to the point that many chose to leave the profession (Hoffman, Assaf, & Paris, 2001) as evidenced by the items that measured teacher motivation and perceiving teaching as being more attractive as a long-term career. The motivation and morale subscale could aid principals in developing interventions for those who have had their motivation and morale decreased to the point that they may soon leave the profession (Hoffman et al.); thus preventing the loss of a considerable investment in terms of recruitment and retention. Principals must also guide curriculum development, school improvement planning, and professional development and could use the instructional support, instructional impact, and motivation and morale subscales to aid in such guidance and planning, respectively. One of the negative consequences of testing has been the limitation of teacher flexibility and creativity (McNeil, 2000), and the instructional impact and support scores may provide insight for principals as to how to impact classroom practice in a positive way and still maintain focus on state standards and accountability (Goertz, 2001; Massell, 2001).

What was interesting in this study is the lack of items associating with the factors that relate to teacher efficacy, student anxiety or apathy, parental involvement, testing special education students, and discrimination against poor and minority students because these were issues that were mentioned as negative consequences associated with high-stakes testing (Abrams, Pedulla, & Madaus, 2003; Goertz & Duffy, 2003; Gulek, 2003; Jones et al., 1999; NcNeil, 2000; Sloane & Kelly, 2003). One explanation may be that the constructs that emerged, (e.g., motivation), are more personal in nature whereas issues such as parental involvement and testing special education students may be viewed as issues that are more external and related to policy rather than being within the realm of direct teacher perceptions. Also, it was interesting that several of the accountability items (grade assigned to the school, FCAT results being linked to school improvement plans, or students' performance impacting the teachers' annual performance evaluation) did not associate with the factors because Florida is a high-stakes testing state in which the latter two of these issues received much attention from the school districts, and the grade assigned to the school, in particular, has received much political and media attention. Again, an explanation for this outcome may be that these items related to district- and state-level policy rather than issues at the personal or classroom level, which is under the teachers' direct control. The results of this study provide support that whether teachers believe that accountability programs improve education or not may be irrelevant (Jones et al.), but that they do perceive that sanctions attached to the test results are linked to accountability (Linn, 2000).

One limitation of this study was that the sample size obtained yielded statistical significance rather than practical significance on many of the composite mean differences observed; however, the THSTS was able to demonstrate utility in detecting group differences, a critical component in the validation process. Future validation efforts will examine the stability of the subscales after expanding the instructional support and impact subscales, and confirmatory factor analysis will be used to determine if the three domains represented in the literature continue to provide the conceptual framework from which the instrument was derived. The major strength of this study was that a simple random sample of teachers throughout Florida was obtained; thus, the results of this study may be truly representative and generalizable to the inferred population of all teachers in the state. Future research will also include exploring these subscales within the context of expanding school reform and statewide standardized testing initiatives. One particular study that we plan to undertake is examining the perceptions of teacher autonomy as it relates to attitudes toward high-stakes or low-stakes statewide testing, because autonomy has also been linked to the success of reform initiatives and whether or not a teacher will stay in the profession (Pearson & Hall, 1993; Pearson & Moomaw, in press). Finally, it is important to note that although there are few specific instruments that have been created to investigate various groups' perceptions of high-

stakes testing, this study did provide a literature-based teacher perception instrument that could be used in future research because it is teachers themselves that directly influence whether external reform initiatives are actually implemented at the classroom level.

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Executive Management Team Demographics at Non-Selective Universities and Community Colleges: Are Executive Teams at Universities Different From Executive Teams at Community Colleges?

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It has generally been assumed that the executive management teams (EMTs) at community colleges are markedly different from their counterparts at universities. Public university and community college EMTs teams perform similar functions, yet are often assumed to be demographically divergent in their makeup. The decision-making performance of the executive management teams at publicly-controlled institutions of higher education is of critical importance to their success. This study examines the demographic characteristics of EMTs at access-oriented, publicly controlled 2- and 4- year institutions of higher education and the differences between the EMTs of 2-year and 4-year institutions.

Introduction

Public university and community college executive management teams (EMTs) perform similar functions (recruiting and retaining students, managing ever more scarce resources, etc.), yet are often assumed to be demographically divergent in their makeup (Amey & VanDerLinden, 2002). The decision-making performance of the executive management teams at publicly-controlled institutions of higher education is of critical importance to their success (Hitt, Ireland, & Hoskisson, 2001). Consequently, optimal practices for enhancing decision-making ability and variations between university and community college EMTs are of critical interest. The importance of examining similarities and differences of EMTs at differing types of access-oriented institutions--the very institutions that certainly will be asked to take on the brunt of increased enrollments coming with Tidal Wave II (the post baby-boom surge of potential higher education students) is therefore of critical importance (Kerr, 1998). To gain a better understanding of EMTs, this study examines the demographic characteristics of EMTs at access-oriented, publicly controlled 2- and 4-year institutions of higher education and the differences between the EMTs of 2-year and 4-year institutions.

Institutions of higher education are experiencing increased pressure to educate more students with fewer resources (Katsinas & Kempner, 2005). This condition places a premium on the importance of effective executive management teams. For purposes of studying policy development and analysis of organizational behavior, it is important to know if the EMTs of community colleges are substantially different than their counterparts at access-oriented public universities.

The State of Texas was chosen for the analysis of EMT demography. Using a single state as a sample universe takes advantage of the existence of a single data reporting system under a unified

coordinating board for all 2- and 4-year public institutions. This allowed for a clear comparison of the demographics of EMTs. Texas is also an advantageous segment of higher education to study due to the number of institutions and the conditions in the state. In Texas, 102 separate institutions report data to the Texas Higher Education Coordinating Board (THECB). Texas is the nation's second largest state, and has an exploding Hispanic population. What happens in Texas clearly can provide insights to higher education as a whole in the United States.

Nationally, over the decade of the 1990s, more than 6.6 million new students entered the nation's elementary and secondary schools (National Center for Education Statistics [NCES], 2004). In the first decade of the new century, this wave of expanded K-12 enrollments is hitting American higher education. The demographics of "Tidal Wave II" (Kerr, 1998) are very different than the "baby boom" era of the 1960s and early 1970s. The baby boom era saw dramatically increased numbers and percentages of projected and actual high school graduates *in all 50 states* (Thompson, 1953). Tidal Wave II, in contrast, is concentrated among 12 to 14 states, including Arizona, California, Florida, New York, and of course, Texas. What all of these states have in common are high levels of immigration, particularly of Hispanics and Asians (NCES, 2004).

In the case of Texas, public 2-year and 4-year nonselective universities and community colleges must respond to a rapidly changing state demography. Table 1 presents data describing the population of Hispanics in Texas and their enrollment in higher education, actual and projected, through 2015. The Hispanic population in Texas has grown markedly in recent years, and is expected to continue to increase into the foreseeable future. This condition enhances the impact of Hispanic under-representation in higher education in Texas.

Table 1
Texas' Hispanic Population as a Percentage of the Total State Population, and the Hispanic Enrollment in Texas Colleges and Universities, 1995-2015

	Texas' Hispanic population		Hispanic enrollment in Texas colleges and universities	
Year	Number	Percent of total population	Number	Percent of population
1995 (actual)	5,067,682	28%	177,036	4.0%
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Note: Percentages are rounded.

*Hispanic enrollments to be attained in order to reach statewide participation goals set by the Texas Higher Education Coordinating Board's master plan, *Closing the Gaps, 2015.*
Sources of Data: Texas Higher Education Coordinating Board (THECB) reports UE 201 and 401, Population Forecast for Texas by Race/Ethnicity: 1990-2030, and *Closing the Gaps by 2015* (2001).

As Table 1 clearly shows, higher education in Texas has much ground to cover and needs to respond rapidly to these demographic conditions if it is to appropriately serve the people of the state. The *Closing the Gaps* master planning initiative built upon the work of Texas State Demographer Steve Murdock, who suggested that unless Texas worked to dramatically expand education opportunities for its new citizens, the state's per capita income average *would actually decline* in constant dollars between 1990 to 2030 (Murdock, Hoque, Michael, White, & Pecotte, 1997). Other states are similarly vulnerable to economic decline due to the limited proliferation of higher education success.

Literature Review

Studies of demographic differences within for-profit executive management teams (EMTs) have revealed to have impacted their propensity to make strategic decisions requiring organizational change (Wiersema & Bantel, 1992). Executive management teams are responsible for strategic level decisions. Strategic decisions are those that impact the long-term direction and mission of an organization (Hitt, Ireland, & Hosdkisson, 2001). The makeup and interaction of the executive management team members influence the decisions that they make (Rajagopalan, Rasheed, & Datta, 1993). Communication among EMT members can even impact organizational structure through necessitating or invalidating formal communication structures (Weick & Browning, 1986). The attitudes and perspectives of executive management teams have been found to be a factor in hindering or facilitating strategic change (Kanter, 2003). A wide range of individual differences have been thought to affect the decision-making process for individuals (West & Schwenk, 1996). These differences include age, education, experience, organizational tenure, and ethnic background (Pelled, Eisenhardt, & Xin, 1999; Tihanyi, Ellstrand, Daily, & Dalton, 2000). No research similar to that investigating the impact of the demographics of large for-profit corporate EMTs has been published in the literature of higher education.

The field of organizational behavior has a number of insights to offer on issues of organizational change. Organizational behavior examines human behavior in institutions or firms, the organizations themselves, and the interaction between the two (Cummings, 1978). Institutions of higher education are a specific type of organization which has certain characteristics and peculiarities that distinguish them from other organizational types. Among the traditional functions of colleges and universities are included the maintenance and distribution of knowledge and culture (Ortega y Gasset, 1944). These purposes--to protect and conserve knowledge and culture--permeate the organizational behavior of higher education. Furthermore, key decision makers in higher education often resist change even in areas unrelated to cultural dissemination, such as degree offerings, program decisions, student services, and student recruitment (Kennedy, 1997). Higher education is also somewhat insulated from the forces of change by the concept of academic freedom (Chait, 1997). These issues and others make institutions of higher education particularly resistant to change (Bensimon & Tierney, 1993). Consequently, the makeup of executive management teams with their corresponding propensity for change is a critical issue for institutions of higher education.

From the private sector literature, it is clear that more decisions are made by groups than by individuals within organizations (Moorehead & Griffin, 1998). A primary advantage of group decision making over individual decisions is the incorporation of a broader range of knowledge and perspectives than would be available to one individual (Dumaine, 1993).

Groups can tend to be dominated by one point of view when an extreme level of cohesiveness exists among the members (Cartwright, 1971). The greater the similarity of the knowledge, experience, and attitudes of group members the more likely it is to narrow the range of alternatives that are considered by the group (Bensimon & Soto, 1997; Pitcher & Smith, 2001). This situation becomes very detrimental in practical decision making. If unlimited time, knowledge, and resources were available, and the people involved were totally dedicated to organizational goals, decisions could be made through a rational process.

Rational decision making is a process where all possible alternatives are generated and evaluated, and the best alternative is chosen (Moorehead & Griffin, 1998). In most situations, however, the decision makers have preferences of their own and decisions are made with highly limited information (Rajagopalan, Rasheed, & Datta, 1993). Consequently, decision-making groups that have a greater breadth of knowledge and viewpoints may be more capable of making good decisions. Diversity of background and experience appear to have a powerful effect on executive decision making. Within group norms and diversity, therefore, are critical components in the understanding of executive management team function. While this process has been studied by Wiersema and Bantel (1992) at 87 of the Fortune 500's largest industrial firms in the for-profit sector, little examination of this process has been done in the higher education sector. In their study, Wiersema and Bantel developed a typology which measured the demographic background of EMT members based on multiple dimensions. The primary goal of this typology was to allow for the measurement of heterogeneity within EMTs. The age, time of EMT service, time in the organization, and size of the EMT, along with heterogeneity figures generated from these measures, were used in the typology. Academic specialization was also included in the model in terms of business establishment fields versus science/technology fields. Heterogeneity within EMTs was then related to a measure of institutional propensity for making major strategic changes. The goal of the Wiersema and Bantel study was to explore a theorized relationship between these measures of EMT heterogeneity and organizational pursuit of strategic change.

Method

The Wiersema and Bantel typology (1992) was adapted to allow for the study of demographic characteristics of the EMTs of non-selective institutions of higher education. The typology was increased to include gender, ethnicity, and educational level measures along with changing the profession measure to reflect an Arts/Education segment in comparison to a science/professions segment.

Study design

The access-oriented state universities and public community colleges in the State of Texas were used as a sample universe for analysis. The only publicly-controlled institutions of higher education in Texas not examined in this study were the flagship campuses of the University of Texas and Texas A & M Systems located in Austin and College Station, respectively, and medical education single use institutions. Both of Texas' flagship institutions have capped total enrollment at approximately 50,000 students each. Thus, if Texas is to achieve its 2015 statewide enrollment goal of 1.5 million enrolled students under THECB's master plan (2000), the key determining factor will *not* be what occurs on the state's two flagship campuses, but rather what happens at the former regional universities that grew from their roots as teachers colleges, and the state's community colleges.

Excluding the flagship universities in Austin and College Station leaves 102 public institutions of higher education in Texas to examine (see Table 2).

Table 2

Texas Public Universities and Community Colleges, Universe and Useable Sample

	Institutions					
	Sample universe			Useable sample.....		
	Community colleges	State universities	Total	Community colleges	State universities.	Total
Number of colleges	68	34	102	19	23	42

	Enrollment (approximate)		
Enrollment number	Total universe 13,800	Total sample 397,000	Percentage of total enrollment in sample 49%

Source of Data: Texas Higher Education Coordinating Board, *Fall Headcount Enrollment: Texas Public Universities, 1997-2001* and *Fall Headcount Enrollment: Texas Public Community, Technical, and State Colleges, 1997-2001.*

Each of the 102 institutions had provided institutional statistical reporting to THECB. Multi-campus university and community college systems considered by THECB to be different institutions for reporting purposes were considered separate institutions in this study. Conversely, multi-campus systems that were single reporting institutions were considered as single entities. This sample universe size is appropriate for multiple analysis of variance according to sample size calculations. Multiple analysis of variance requires a sample size of 31 or greater to properly measure relatively small differences (Al-Bayyati, 1971).

Only colleges and universities with available and complete data on their executive management teams were included in this sample. All observations in the sample universe with available full data were included in the data set. Forty-two observations were included in the data set: 19 community colleges and 23 universities. As Table 2 shows, the sample represented approximately 49% of the enrollment in the sample universe. The university portion of the sample was made up of approximately 71% of the total university enrollment in the sample universe and the community college portion of the sample represented approximately 33% of the community college enrollment in the sample universe.

Data analysis

Analysis of variance was then used to determine differences between the state university sub-sample and the community college sub-sample. This was explored using an *F*-statistic to determine the statistical significance of any differences in the groups and with a Levine statistic to measure homogeneity across sub-groups of different size (Ashenfelter, Zimmerman, & Levine, 2002). Demographic characteristic data were collected on the top managers of each organization. The top managers were defined as the president and all vice-presidents. The time frame examined in this study was the 2-year period from January 2000 to January 2002. When transition occurred during this time period, the executive who held the position for the

longest period of time was included in the data set. If an appropriate executive could not be found or if only limited information were available on the 13 demographic characteristics under review, then the institution was not included in the sample. This roughly mirrored the executive management team typology deployed by Wiersema and Bantel (1992) to examine large for-profit corporations.

Demographic information on top managers was drawn from the *2000 Who's Who in Education. Who's Who in Education* is the most comprehensive national source of demographic information on higher education administrators that is currently available (American Association of School Administrators, 2000). Other sources that were used in the information gathering process were the *Higher Education Directory* (Higher Education Publications, 2000), and the *Contemporary Authors* database (Gale Literary Dabatases, 2002). These were supplemented by biographical information published on the Web sites of the universities. When pieces of individual data were still unavailable, discussions with institutional research officers at certain universities were used to supplement published information. These demographic data were used to determine organizational time of service, age, and top management team time of service.

The 13 demographic characteristics were statistically examined in two ways. Each characteristic was averaged to produce a picture of an average EMT without regard to type of institution (university or community college). Then, an analysis of variance was performed to measure similarities and differences within each of the characteristics, and where appropriate, consistent with Wiersema and Bantel (1992), a logarithm of the coefficient of variation was generated to reflect the expected shrinking effect of the dissimilarity of demographic characteristic, and a second logarithm performed to correct for severe positive skew.

The 13 demographic characteristics of EMTs examined were: (a) mean age of EMT (average age of EMT members); (b) mean range of age of EMT (extent of heterogeneity of EMT member age); (c) time heterogeneity of EMT (difference between consecutive times of membership as an executive among individuals within the EMT); (d) organizational time heterogeneity of EMT (the difference between consecutive times of service to the organization in any capacity by individuals within the EMT); (e) mean education level of EMT, determined by highest degree attained; (f) liberal/fine arts/education degrees held by EMT members (responses here can be compared to percentages of EMTs who alternatively indicated the sciences/professions category, which includes sciences, applied sciences, health fields, law, engineering, and social sciences such as sociology, business, economics and technological studies, a method similar to that deployed by Wiersema and Bantel); (g) EMT total mean organizational time (average years of service by EMT members at their institution including both time spent in executive and non-executive positions); (h) EMT mean time in executive service (average years of service as a members of the EMT); (i) EMT ethnic heterogeneity (number of groups represented in the EMT among four groups of racial origin-Caucasian, African American, Hispanic, and Asian; institutions with only one ethnic group represented were coded as one indicating a minimum level of heterogeneity, and Caucasian was considered to be equal to the other racial groups for heterogeneity purposes); (j) percentage of male EMT members; and (k) EMT size (number of executives at each institution); (l) percentage of Caucasians (recorded for the EMT of each institution; an inverse transformation procedure was performed due to a skewed data set); and (m) percentage of careers in higher education (percentage of executives who had spent their entire careers in higher education; an inverse transformation procedure was performed due to a skewed data set).

Results and Discussion

Demographically, for both types of access institutions taken together, the typical executive management team at a Texas publicly controlled access institution of higher education between 2000 and 2002 had four members, and was predominantly comprised of males (74.3%) and Caucasians (74.2%). Many groups included representatives of only one or two of the four racial and ethnic groups examined in this study (Caucasians, African Americans, Hispanics, and Asians), although some did include three. The university and community college subgroups were very similar on this variable with averages of 1.7 and 1.4 of the four groups represented, respectively (this difference was not statistically significant at the $p < .1$ level, and the direction of the influence was split). The average executive was 55 years of age (54.7), had been with his/her organization 12 years (12.1), and had been an executive for 6 years (6.3). Executives in the study averaged 9.2 years of higher education (with 10 years representing a first-professional earned doctorate) and 79% had spent their entire careers in the field of higher education. By field of highest degree earned, 75.6% of community colleges had EMT members with liberal/fine arts/education degrees, while the universities in the survey only had 45.9% of their administrators with liberal/fine arts/education backgrounds.

Analysis of Variance

The demographic variables of this study were analyzed for differences using an analysis of variance procedure. Various levels of statistical significance were recorded, consistent with the Wiersema and Bantel methodology (1992). By type of institution (university or community college), 3 of the 13 demographic variables were significantly different ($p < .10$), and one variable, educational specialization by field of highest degree earned, was significantly different at the .05 level. Educational specialization by field of highest degree earned of EMT members is a variable that differs sharply by type of institution. The community colleges examined in the survey had 75.6% of their administrators holding liberal/fine arts/education backgrounds, while the universities in the survey only had 45.9% of their administrators holding those backgrounds.

Two variables were found to be significant at the 0.10 level using the ANOVA testing, mean organizational time and age heterogeneity. The average years of executive service of an institution's EMT was higher at universities (7.0 years) than at community colleges (5.4 years). Age heterogeneity, the spread of difference in ages among members of an institution's EMT, was higher (.1516) in community colleges than in universities (.1123) in the data set (See Table 3).

Table 3

Analysis of Variance for Average Means, Group Members, and Percentages of Demographic Characteristics of Executive Management Teams at Publicly-Controlled Universities and Community Colleges in Texas, 2000-2002

Demographic characteristic	*M*	Levene statistic	*MS*	*F*-value	Significance of *F*-value
Age of EMT	54.7	2.275	30.672	1.581	.216
Range of age of EMT	13.0	11.322	0.016	2.947	.094*t*
Time heterogeneity of EMT	6.3 yrs.	.215	0.011	0.505	.482
Organizational time Heterogeneity of EMT	-0.206 yrs.	.657	0.072	.155	.289
Education level of EMT	9.2 yrs.	.088	0.000	0.068	.796
Liberal/fine arts/education degrees held by EMT		16.587	0.002	10.087	.003**
Time in organization	12.1 yrs.	3.490	0.544	0.594	.445
Time on EMT	6.3 yrs.	2.493	26.994	3.317	.076*t*
Ethnic heterogeneity of EMT	1.6 groups	.064	0.331	0.664	.420
% of males in EMT	74.3	2.992	787.628	1.759	.192
Size of EMT (# persons)	4.0	.682	3.884	2.551	.118*f*
% Caucasian of EMT	73.2	3.569	457.384	0.809	.374
% of EMT with entire career in HIED	79*t*	1.068	0.002	0.154	.697

Degrees of Freedom = 41
fp < .15
tp < .10
**p* < .05
***p*< .01

Few statistically significant differences in the demographic characteristics were found between the executive management teams at Texas public universities and community colleges. Only three of the demographic variables were significantly different in the analysis of variance procedure. This provides an indication that from a demographic standpoint, both types of higher education institutions have similar EMTs. Consequently, findings about one classification (university or community college) can be generalized for use on the other with respect to EMTs.

Three demographic characteristics showed statistically significant differences between the university and community college subgroups: liberal/fine arts/education degrees held by EMT members (educational specialization), mean range of age of EMT, and mean time on EMT showed statistically significant differences between universities and community colleges. Educational specialization (liberal/fine arts/education degrees held by EMT members) has a statistically significant difference at the 0.003 level for the university and community college subgroups, with higher percentages of executives with liberal arts, fine arts, or education degrees at community colleges than at universities. Further examination revealed additional details regarding specific fields. First, EMT members reporting degrees in education as their highest degree earned were far and away the most numerous among community college executives, comprising 55.5% of community college executives. In contrast, the largest portion of university executives had attained their highest earned degree in business (26.4%). Given these proportions, education and business each featured prominently in both university and community college EMTs. Education degree majors made up 37.1% of the executives in the survey while business majors made up 21.3%. Liberal arts was the only other major with a double-digit percentage of the executives in the survey (18.5%). These data indicate the importance of a strong pathway or pipeline of doctoral degree programs in the field of higher education/community college leadership, to provide a supply of appropriately trained community college leaders. Apprehension over support of this pipeline at universities has been a topic of concern among experts in recent years (Katsinas & Kempner, 2005).

Mean time on the EMT was significantly different in the universities and the community colleges, with the measured difference significant at the 0.076 level. The average university executive had 7.4 years of executive service at his/her institution while community college executives averaged only 5.43 years. Age heterogeneity, the level of age difference between members of an institution's executive management team, was significantly different at the 0.094 level. Community college EMTs were more heterogeneous by age than those of universities, suggesting that the dramatic turnover of leadership among community college EMTs predicted by Amey and VanDerLinden (2002) and Shults (2001), and many others is in fact occurring.

It should also be noted that business and education include certain degree fields that specifically equip graduates for administrative careers. The fields of management and business administration teach general administrative principles and methods while higher education and educational leadership teach administrative principles from a higher education prospective. Higher education for example has, as a field, long been strongly associated with the preparation of community college administrators (Fife & Goodchild, 1991). A certain level of representation of these fields may be advantageous for executive decision-making teams, particularly at the community college level, which may explain the greater predominance of degrees in education held by EMT members at community colleges in this study.

The demographic characteristics of executive management teams of universities and community colleges in Texas appear to

be more demographically alike then they are different. Similar studies are clearly needed in other states; that said, the oft assumed differences of educational level, gender, and race representation were not found to be significantly different here. Only educational specialization (field category of the highest degree attained) proved to be highly significant in this study. This finding is very important in that strategies to enhance the capability of executive decision-making teams of universities can be expected to be useful in the community college context. The opposite is true for strategies developed for community colleges. Universities and community colleges are different types of organizations but the people who run them from the perspective of the 13 demographic characteristics assessed in this study appear quite similar. It is through studying the characteristics of these groups that an improved understanding of executive decision making at public institutions of higher education can be achieved.

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Executive Management Team Demographics at Non-Selective Universities and Community Colleges: Are Executive Teams at Universities Different From Executive Teams at Community Colleges?

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It has generally been assumed that the executive management teams (EMTs) at community colleges are markedly different from their counterparts at universities. Public university and community college EMTs teams perform similar functions, yet are often assumed to be demographically divergent in their makeup. The decision-making performance of the executive management teams at publicly-controlled institutions of higher education is of critical importance to their success. This study examines the demographic characteristics of EMTs at access-oriented, publicly controlled 2- and 4- year institutions of higher education and the differences between the EMTs of 2-year and 4-year institutions.

Introduction

Public university and community college executive management teams (EMTs) perform similar functions (recruiting and retaining students, managing ever more scarce resources, etc.), yet are often assumed to be demographically divergent in their makeup (Amey & VanDerLinden, 2002). The decision-making performance of the executive management teams at publicly-controlled institutions of higher education is of critical importance to their success (Hitt, Ireland, & Hoskisson, 2001). Consequently, optimal practices for enhancing decision-making ability and variations between university and community college EMTs are of critical interest. The importance of examining similarities and differences of EMTs at differing types of access-oriented institutions--the very institutions that certainly will be asked to take on the brunt of increased enrollments coming with Tidal Wave II (the post baby-boom surge of potential higher education students) is therefore of critical importance (Kerr, 1998). To gain a better understanding of EMTs, this study examines the demographic characteristics of EMTs at access-oriented, publicly controlled 2- and 4-year institutions of higher education and the differences between the EMTs of 2-year and 4-year institutions.

Institutions of higher education are experiencing increased pressure to educate more students with fewer resources (Katsinas & Kempner, 2005). This condition places a premium on the importance of effective executive management teams. For purposes of studying policy development and analysis of organizational behavior, it is important to know if the EMTs of community colleges are substantially different than their counterparts at access-oriented public universities.

The State of Texas was chosen for the analysis of EMT demography. Using a single state as a sample universe takes advantage of the existence of a single data reporting system under a unified

coordinating board for all 2- and 4-year public institutions. This allowed for a clear comparison of the demographics of EMTs. Texas is also an advantageous segment of higher education to study due to the number of institutions and the conditions in the state. In Texas, 102 separate institutions report data to the Texas Higher Education Coordinating Board (THECB). Texas is the nation's second largest state, and has an exploding Hispanic population. What happens in Texas clearly can provide insights to higher education as a whole in the United States.

Nationally, over the decade of the 1990s, more than 6.6 million new students entered the nation's elementary and secondary schools (National Center for Education Statistics [NCES], 2004). In the first decade of the new century, this wave of expanded K-12 enrollments is hitting American higher education. The demographics of "Tidal Wave II" (Kerr, 1998) are very different than the "baby boom" era of the 1960s and early 1970s. The baby boom era saw dramatically increased numbers and percentages of projected and actual high school graduates *in all 50 states* (Thompson, 1953). Tidal Wave II, in contrast, is concentrated among 12 to 14 states, including Arizona, California, Florida, New York, and of course, Texas. What all of these states have in common are high levels of immigration, particularly of Hispanics and Asians (NCES, 2004).

In the case of Texas, public 2-year and 4-year nonselective universities and community colleges must respond to a rapidly changing state demography. Table 1 presents data describing the population of Hispanics in Texas and their enrollment in higher education, actual and projected, through 2015. The Hispanic population in Texas has grown markedly in recent years, and is expected to continue to increase into the foreseeable future. This condition enhances the impact of Hispanic under-representation in higher education in Texas.

Table 1
Texas' Hispanic Population as a Percentage of the Total State Population, and the Hispanic Enrollment in Texas Colleges and Universities, 1995-2015

	Texas' Hispanic population		Hispanic enrollment in Texas colleges and universities	
Year	Number	Percent of total population	Number	Percent of population
1995 (actual)	5,067,682	28%	177,036	4.0%
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Literature Review

Studies of demographic differences within for-profit executive management teams (EMTs) have revealed to have impacted their propensity to make strategic decisions requiring organizational change (Wiersema & Bantel, 1992). Executive management teams are responsible for strategic level decisions. Strategic decisions are those that impact the long-term direction and mission of an organization (Hitt, Ireland, & Hosdkisson, 2001). The makeup and interaction of the executive management team members influence the decisions that they make (Rajagopalan, Rasheed, & Datta, 1993). Communication among EMT members can even impact organizational structure through necessitating or invalidating formal communication structures (Weick & Browning, 1986). The attitudes and perspectives of executive management teams have been found to be a factor in hindering or facilitating strategic change (Kanter, 2003). A wide range of individual differences have been thought to affect the decision-making process for individuals (West & Schwenk, 1996). These differences include age, education, experience, organizational tenure, and ethnic background (Pelled, Eisenhardt, & Xin, 1999; Tihanyi, Ellstrand, Daily, & Dalton, 2000). No research similar to that investigating the impact of the demographics of large for-profit corporate EMTs has been published in the literature of higher education.

The field of organizational behavior has a number of insights to offer on issues of organizational change. Organizational behavior examines human behavior in institutions or firms, the organizations themselves, and the interaction between the two (Cummings, 1978). Institutions of higher education are a specific type of organization which has certain characteristics and peculiarities that distinguish them from other organizational types. Among the traditional functions of colleges and universities are included the maintenance and distribution of knowledge and culture (Ortega y Gasset, 1944). These purposes--to protect and conserve knowledge and culture--permeate the organizational behavior of higher education. Furthermore, key decision makers in higher education often resist change even in areas unrelated to cultural dissemination, such as degree offerings, program decisions, student services, and student recruitment (Kennedy, 1997). Higher education is also somewhat insulated from the forces of change by the concept of academic freedom (Chait, 1997). These issues and others make institutions of higher education particularly resistant to change (Bensimon & Tierney, 1993). Consequently, the makeup of executive management teams with their corresponding propensity for change is a critical issue for institutions of higher education.

From the private sector literature, it is clear that more decisions are made by groups than by individuals within organizations (Moorehead & Griffin, 1998). A primary advantage of group decision making over individual decisions is the incorporation of a broader range of knowledge and perspectives than would be available to one individual (Dumaine, 1993).

Groups can tend to be dominated by one point of view when an extreme level of cohesiveness exists among the members (Cartwright, 1971). The greater the similarity of the knowledge, experience, and attitudes of group members the more likely it is to narrow the range of alternatives that are considered by the group (Bensimon & Soto, 1997; Pitcher & Smith, 2001). This situation becomes very detrimental in practical decision making. If unlimited time, knowledge, and resources were available, and the people involved were totally dedicated to organizational goals, decisions could be made through a rational process.

Rational decision making is a process where all possible alternatives are generated and evaluated, and the best alternative is chosen (Moorehead & Griffin, 1998). In most situations, however, the decision makers have preferences of their own and decisions are made with highly limited information (Rajagopalan, Rasheed, & Datta, 1993). Consequently, decision-making groups that have a greater breadth of knowledge and viewpoints may be more capable of making good decisions. Diversity of background and experience appear to have a powerful effect on executive decision making. Within group norms and diversity, therefore, are critical components in the understanding of executive management team function. While this process has been studied by Wiersema and Bantel (1992) at 87 of the Fortune 500's largest industrial firms in the for-profit sector, little examination of this process has been done in the higher education sector. In their study, Wiersema and Bantel developed a typology which measured the demographic background of EMT members based on multiple dimensions. The primary goal of this typology was to allow for the measurement of heterogeneity within EMTs. The age, time of EMT service, time in the organization, and size of the EMT, along with heterogeneity figures generated from these measures, were used in the typology. Academic specialization was also included in the model in terms of business establishment fields versus science/technology fields. Heterogeneity within EMTs was then related to a measure of institutional propensity for making major strategic changes. The goal of the Wiersema and Bantel study was to explore a theorized relationship between these measures of EMT heterogeneity and organizational pursuit of strategic change.

Method

The Wiersema and Bantel typology (1992) was adapted to allow for the study of demographic characteristics of the EMTs of non-selective institutions of higher education. The typology was increased to include gender, ethnicity, and educational level measures along with changing the profession measure to reflect an Arts/Education segment in comparison to a science/professions segment.

Study design

The access-oriented state universities and public community colleges in the State of Texas were used as a sample universe for analysis. The only publicly-controlled institutions of higher education in Texas not examined in this study were the flagship campuses of the University of Texas and Texas A & M Systems located in Austin and College Station, respectively, and medical education single use institutions. Both of Texas' flagship institutions have capped total enrollment at approximately 50,000 students each. Thus, if Texas is to achieve its 2015 statewide enrollment goal of 1.5 million enrolled students under THECB's master plan (2000), the key determining factor will *not* be what occurs on the state's two flagship campuses, but rather what happens at the former regional universities that grew from their roots as teachers colleges, and the state's community colleges.

Excluding the flagship universities in Austin and College Station leaves 102 public institutions of higher education in Texas to examine (see Table 2).

Table 2

Texas Public Universities and Community Colleges, Universe and Useable Sample

	Institutions					
	Sample universe			Useable sample.....		
	Community colleges	State universities	Total	Community colleges	State universities.	Total
Number of colleges	68	34	102	19	23	42

	Enrollment (approximate)		
Enrollment number	Total universe 13,800	Total sample 397,000	Percentage of total enrollment in sample 49%

Source of Data: Texas Higher Education Coordinating Board, *Fall Headcount Enrollment: Texas Public Universities, 1997-2001* and *Fall Headcount Enrollment: Texas Public Community, Technical, and State Colleges, 1997-2001.*

Each of the 102 institutions had provided institutional statistical reporting to THECB. Multi-campus university and community college systems considered by THECB to be different institutions for reporting purposes were considered separate institutions in this study. Conversely, multi-campus systems that were single reporting institutions were considered as single entities. This sample universe size is appropriate for multiple analysis of variance according to sample size calculations. Multiple analysis of variance requires a sample size of 31 or greater to properly measure relatively small differences (Al-Bayyati, 1971).

Only colleges and universities with available and complete data on their executive management teams were included in this sample. All observations in the sample universe with available full data were included in the data set. Forty-two observations were included in the data set: 19 community colleges and 23 universities. As Table 2 shows, the sample represented approximately 49% of the enrollment in the sample universe. The university portion of the sample was made up of approximately 71% of the total university enrollment in the sample universe and the community college portion of the sample represented approximately 33% of the community college enrollment in the sample universe.

Data analysis

Analysis of variance was then used to determine differences between the state university sub-sample and the community college sub-sample. This was explored using an *F*-statistic to determine the statistical significance of any differences in the groups and with a Levine statistic to measure homogeneity across sub-groups of different size (Ashenfelter, Zimmerman, & Levine, 2002). Demographic characteristic data were collected on the top managers of each organization. The top managers were defined as the president and all vice-presidents. The time frame examined in this study was the 2-year period from January 2000 to January 2002. When transition occurred during this time period, the executive who held the position for the

longest period of time was included in the data set. If an appropriate executive could not be found or if only limited information were available on the 13 demographic characteristics under review, then the institution was not included in the sample. This roughly mirrored the executive management team typology deployed by Wiersema and Bantel (1992) to examine large for-profit corporations.

Demographic information on top managers was drawn from the *2000 Who's Who in Education. Who's Who in Education* is the most comprehensive national source of demographic information on higher education administrators that is currently available (American Association of School Administrators, 2000). Other sources that were used in the information gathering process were the *Higher Education Directory* (Higher Education Publications, 2000), and the *Contemporary Authors* database (Gale Literary Dabatases, 2002). These were supplemented by biographical information published on the Web sites of the universities. When pieces of individual data were still unavailable, discussions with institutional research officers at certain universities were used to supplement published information. These demographic data were used to determine organizational time of service, age, and top management team time of service.

The 13 demographic characteristics were statistically examined in two ways. Each characteristic was averaged to produce a picture of an average EMT without regard to type of institution (university or community college). Then, an analysis of variance was performed to measure similarities and differences within each of the characteristics, and where appropriate, consistent with Wiersema and Bantel (1992), a logarithm of the coefficient of variation was generated to reflect the expected shrinking effect of the dissimilarity of demographic characteristic, and a second logarithm performed to correct for severe positive skew.

The 13 demographic characteristics of EMTs examined were: (a) mean age of EMT (average age of EMT members); (b) mean range of age of EMT (extent of heterogeneity of EMT member age); (c) time heterogeneity of EMT (difference between consecutive times of membership as an executive among individuals within the EMT); (d) organizational time heterogeneity of EMT (the difference between consecutive times of service to the organization in any capacity by individuals within the EMT); (e) mean education level of EMT, determined by highest degree attained; (f) liberal/fine arts/education degrees held by EMT members (responses here can be compared to percentages of EMTs who alternatively indicated the sciences/professions category, which includes sciences, applied sciences, health fields, law, engineering, and social sciences such as sociology, business, economics and technological studies, a method similar to that deployed by Wiersema and Bantel); (g) EMT total mean organizational time (average years of service by EMT members at their institution including both time spent in executive and non-executive positions); (h) EMT mean time in executive service (average years of service as a members of the EMT); (i) EMT ethnic heterogeneity (number of groups represented in the EMT among four groups of racial origin-Caucasian, African American, Hispanic, and Asian; institutions with only one ethnic group represented were coded as one indicating a minimum level of heterogeneity, and Caucasian was considered to be equal to the other racial groups for heterogeneity purposes); (j) percentage of male EMT members; and (k) EMT size (number of executives at each institution); (l) percentage of Caucasians (recorded for the EMT of each institution; an inverse transformation procedure was performed due to a skewed data set); and (m) percentage of careers in higher education (percentage of executives who had spent their entire careers in higher education; an inverse transformation procedure was performed due to a skewed data set).

Results and Discussion

Demographically, for both types of access institutions taken together, the typical executive management team at a Texas publicly controlled access institution of higher education between 2000 and 2002 had four members, and was predominantly comprised of males (74.3%) and Caucasians (74.2%). Many groups included representatives of only one or two of the four racial and ethnic groups examined in this study (Caucasians, African Americans, Hispanics, and Asians), although some did include three. The university and community college subgroups were very similar on this variable with averages of 1.7 and 1.4 of the four groups represented, respectively (this difference was not statistically significant at the $p < .1$ level, and the direction of the influence was split). The average executive was 55 years of age (54.7), had been with his/her organization 12 years (12.1), and had been an executive for 6 years (6.3). Executives in the study averaged 9.2 years of higher education (with 10 years representing a first-professional earned doctorate) and 79% had spent their entire careers in the field of higher education. By field of highest degree earned, 75.6% of community colleges had EMT members with liberal/fine arts/education degrees, while the universities in the survey only had 45.9% of their administrators with liberal/fine arts/education backgrounds.

Analysis of Variance

The demographic variables of this study were analyzed for differences using an analysis of variance procedure. Various levels of statistical significance were recorded, consistent with the Wiersema and Bantel methodology (1992). By type of institution (university or community college), 3 of the 13 demographic variables were significantly different ($p < .10$), and one variable, educational specialization by field of highest degree earned, was significantly different at the .05 level. Educational specialization by field of highest degree earned of EMT members is a variable that differs sharply by type of institution. The community colleges examined in the survey had 75.6% of their administrators holding liberal/fine arts/education backgrounds, while the universities in the survey only had 45.9% of their administrators holding those backgrounds.

Two variables were found to be significant at the 0.10 level using the ANOVA testing, mean organizational time and age heterogeneity. The average years of executive service of an institution's EMT was higher at universities (7.0 years) than at community colleges (5.4 years). Age heterogeneity, the spread of difference in ages among members of an institution's EMT, was higher (.1516) in community colleges than in universities (.1123) in the data set (See Table 3).

Table 3

Analysis of Variance for Average Means, Group Members, and Percentages of Demographic Characteristics of Executive Management Teams at Publicly-Controlled Universities and Community Colleges in Texas, 2000-2002

Demographic characteristic	*M*	Levene statistic	*MS*	*F*-value	Significance of *F*-value
Age of EMT	54.7	2.275	30.672	1.581	.216
Range of age of EMT	13.0	11.322	0.016	2.947	.094*t*
Time heterogeneity of EMT	6.3 yrs.	.215	0.011	0.505	.482
Organizational time Heterogeneity of EMT	-0.206 yrs.	.657	0.072	.155	.289
Education level of EMT	9.2 yrs.	.088	0.000	0.068	.796
Liberal/fine arts/education degrees held by EMT		16.587	0.002	10.087	.003**
Time in organization	12.1 yrs.	3.490	0.544	0.594	.445
Time on EMT	6.3 yrs.	2.493	26.994	3.317	.076*t*
Ethnic heterogeneity of EMT	1.6 groups	.064	0.331	0.664	.420
% of males in EMT	74.3	2.992	787.628	1.759	.192
Size of EMT (# persons)	4.0	.682	3.884	2.551	.118*f*
% Caucasian of EMT	73.2	3.569	457.384	0.809	.374
% of EMT with entire career in HIED	79*t*	1.068	0.002	0.154	.697

Degrees of Freedom = 41
fp < .15
tp < .10
**p* < .05
***p*< .01

Few statistically significant differences in the demographic characteristics were found between the executive management teams at Texas public universities and community colleges. Only three of the demographic variables were significantly different in the analysis of variance procedure. This provides an indication that from a demographic standpoint, both types of higher education institutions have similar EMTs. Consequently, findings about one classification (university or community college) can be generalized for use on the other with respect to EMTs.

Three demographic characteristics showed statistically significant differences between the university and community college subgroups: liberal/fine arts/education degrees held by EMT members (educational specialization), mean range of age of EMT, and mean time on EMT showed statistically significant differences between universities and community colleges. Educational specialization (liberal/fine arts/education degrees held by EMT members) has a statistically significant difference at the 0.003 level for the university and community college subgroups, with higher percentages of executives with liberal arts, fine arts, or education degrees at community colleges than at universities. Further examination revealed additional details regarding specific fields. First, EMT members reporting degrees in education as their highest degree earned were far and away the most numerous among community college executives, comprising 55.5% of community college executives. In contrast, the largest portion of university executives had attained their highest earned degree in business (26.4%). Given these proportions, education and business each featured prominently in both university and community college EMTs. Education degree majors made up 37.1% of the executives in the survey while business majors made up 21.3%. Liberal arts was the only other major with a double-digit percentage of the executives in the survey (18.5%). These data indicate the importance of a strong pathway or pipeline of doctoral degree programs in the field of higher education/community college leadership, to provide a supply of appropriately trained community college leaders. Apprehension over support of this pipeline at universities has been a topic of concern among experts in recent years (Katsinas & Kempner, 2005).

Mean time on the EMT was significantly different in the universities and the community colleges, with the measured difference significant at the 0.076 level. The average university executive had 7.4 years of executive service at his/her institution while community college executives averaged only 5.43 years. Age heterogeneity, the level of age difference between members of an institution's executive management team, was significantly different at the 0.094 level. Community college EMTs were more heterogeneous by age than those of universities, suggesting that the dramatic turnover of leadership among community college EMTs predicted by Amey and VanDerLinden (2002) and Shults (2001), and many others is in fact occurring.

It should also be noted that business and education include certain degree fields that specifically equip graduates for administrative careers. The fields of management and business administration teach general administrative principles and methods while higher education and educational leadership teach administrative principles from a higher education prospective. Higher education for example has, as a field, long been strongly associated with the preparation of community college administrators (Fife & Goodchild, 1991). A certain level of representation of these fields may be advantageous for executive decision-making teams, particularly at the community college level, which may explain the greater predominance of degrees in education held by EMT members at community colleges in this study.

The demographic characteristics of executive management teams of universities and community colleges in Texas appear to

be more demographically alike then they are different. Similar studies are clearly needed in other states; that said, the oft assumed differences of educational level, gender, and race representation were not found to be significantly different here. Only educational specialization (field category of the highest degree attained) proved to be highly significant in this study. This finding is very important in that strategies to enhance the capability of executive decision-making teams of universities can be expected to be useful in the community college context. The opposite is true for strategies developed for community colleges. Universities and community colleges are different types of organizations but the people who run them from the perspective of the 13 demographic characteristics assessed in this study appear quite similar. It is through studying the characteristics of these groups that an improved understanding of executive decision making at public institutions of higher education can be achieved.

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Leading Ladies: Celebrating Two Voices

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The testimonies of two exemplary women educational leaders who have taught in Caribbean schools, served at national and regional levels, and transformed lives and educational systems are presented. Their testimonies share their evolutionary experiences as educational leaders and their perspectives of what is critical to such leadership. This study uses oral history methodology and aims to share, celebrate, and value the lessons of these participant-exemplars. Findings from the study reveal leadership as an evolutionary process, nurtured by spirituality, community, and a sense of gender equity and inter-relatedness in the lives of the participants.

Effective leadership is associated with valued educational policies and practices that serve as motivation to change when reform is warranted (Algozzine, Yselldyke, & Campbell, 1994; Kouzes & Posner, 1999). Such leadership is characterized as a voluntary, progressive change in the beliefs, behaviors, and attitudes of its stakeholders toward the realization of a common vision. The compulsory and involuntary nature of education, the ages of clients, and the inherent power of educators make schools even more vulnerable to the influence of leadership. In the "developing world" of the Caribbean there is a pervasive perception that educational leadership is less a process of reform and more about the control and manipulation of systems by a patriarchal bureaucracy (Morris, 1999). This is further complicated by a tendency to consolidate autocratic and transactional leadership styles, where leaders see themselves as implementers, not agents, of reform. Such a response – when schools are under-financed, overcrowded with hostile and troubled students, and have increasing numbers of disaffected teachers – does little to significantly address academic underachievement and teacher burnout (Conrad & Brown, 2004).

This is not to suggest that educational leaders do not claim an active and informed voice nor challenge the established patriarchy. The more effective educational leaders do, but generally seek a non-confrontational stance in their interaction with the bureaucracy. They opt to present their differing perspectives and positions as "connected knowers" (Alfred, 2003). Their strategy for reform is achieved through relational and community based efforts. Such a purposeful, resourceful, and resilient responsiveness of these leaders to teacher, student, and community needs is critical to the well-being of the community (Nieto, 2003).

For the few women educational leaders in Trinidad and Tobago who have successfully navigated the centralized bureaucracy, their resilience and responsiveness to their communities have been silenced by an under-recording of their contributions and skills (Morris, 1999; Taylor, 1997). This non-legitimization is pervasive, despite a higher percentage of women in the teaching profession, more equitable numbers as principals, particularly at elementary and special schools, and higher levels of academic qualifications among women (Taylor). The primary purpose of this study, then, is to legitimize the presence of Caribbean women by

sharing their stories, celebrating their contributions to the community, and adding their voices to the discourse on educational leadership.

Theoretical Connections

In attempting to understand leadership, Stogdill (1950) describes it as a process that influences group activities regarding goal setting and achievement. For Senge (1990) leadership is synonymous with developing vision and values, servicing by modeling, and teaching through fostering learning for all. Bolman and Deal (1991) add a relational focus to shared vision, purpose and values, stressing commitment to passion, trust, flexibility, interpersonal skills, and understanding of followers. DePree (1989) links leadership to communication, storytelling, and intimacy as an art-medium. Pfeffer (2003), however, proposes a move away from leadership as a process to a product-oriented interpretation, where the leader is a facilitator of change and consensus.

Researchers and practitioners continue to explore the complexities of leadership as process and product. From an early focus on personality traits in the 1930s to contemporary "New Paradigm" models of motivation based leadership, the results indicate the value of leadership to overall organizational effectiveness (Bryman, 1996; Kets De Vries, 1998). More recently, Fry (2003) links the importance of "spiritual leadership" where the leader's and followers' need for a mission and meaning in an organizational culture allows for authenticity (Duignan & Bhindi, 1997; Pfeffer, 2003).

Women and Leadership

Sharing the voices of the participants of this study places gendered experiences and contributions center stage, which according to Reinharz (1992), warrants consideration as a feminist inquiry. Feminist theorists believe that women are less valued and have less power in a male dominated world. They are committed to improving their status, while acknowledging women's ways of knowing, experiences, and values as meaningful (Acker, 1987). Further, this paper articulates the stories from within a Caribbean context, which is often marginalized or ignored by second wave feminists of the pre 1970s (Hernandez & Rehman, 2002). The voices of the Caribbean feminist movement resonate with, but are not synonymous with, mainstream western European, African-American, or African perspectives (Leo-Rhynie, Baily, & Barrow, 1997). Caribbean women are expected to be economically independent and are accepted as leaders within the community. They have great variability of socially acceptable conjugal relations (not necessarily seeing marriage as preferred option); and are essentially autonomous (Morse, 1991). Their autonomy has been ascribed to there being no division of labor on the plantation that limited the economic participation of women, and the social distance between free Whites and enslaved Blacks. This limited the imposition of dominant class ideologies and facilitated the retention and development of distinct cultural patterns and concepts about the roles and attributes of these women (Morse, p. 495).

Regarding more generic perspectives of women in leadership, Irby and Brown (1995) recognize the role of bureaucratization in limiting women's aspirations to leadership, asserting that there is a need for reconceptualizing leadership theory to incorporate the contributions of both genders, and to limit the White male stereotype manifested in most traditional research. Rosener (1990) posits that men are perceived as exemplifying power, dominance and control, while women are perceived as exemplifying collaboration. Such differences in leadership styles have been associated with learning experiences and positions within the society (Klenke, 1996). Astin and Leland (1991) hold that women leaders more typically form networks with talented personnel, and highly value listening and interpersonal skills, along with collegial and consensual styles.

These values are associated with transformational leadership styles (Bass, 1998).

Partly to recognize the contributions and effectiveness of the women participants and to celebrate their contributions, this study sought answers to the following questions: (a) What do Caribbean women reveal about factors which contributed to their evolution as educational leaders? and (b) What are some of the issues that characterize their experiences as women educational leaders?

Method

The interviews were completed over a 1-year period, and comprised of guiding questions and a set of prompts, which were used sparingly to keep the inquiry focused. The guiding questions were aimed at getting participants to share their experiences as they apply to educational leadership. The first item was: As a woman identified as an effective and exemplary leader, tell me about yourself and your journey as an educational leader. This item was followed up with inquiry into childhood experiences that prepared them for a career in education as well as how they felt about their contributions to the educational community. We then asked: What are the issues you identify as important to educational leadership? This was followed by prompts such as, Tell me about the person who had the most impact on your development as an educational leader and how has your professional training contributed to your evolution as an educational leader? We also asked how being a woman has hindered or contributed to their evolution, including any significant experience(s). Finally, they were invited to share any views about a unique leadership style, attributable to women.

An oral history approach was used to emphasize the depth of experiences unique to this small population (Reinharz, 1992). The method also minimized intrusion on the participants' time, and afforded opportunities for discussion and exploration. Participants shared self-determined, comprehensive stories with few restrictions.

Participants

The two participants were chosen from a list of 15 special and regular education school principals generated at a 1999 meeting in Trinidad and Tobago. These educational leaders were invited to the meeting because of their commitment to inclusive education practices and their overall leadership roles. The chair of the meeting conducted the list-generating activity at the request of the primary researcher. Participating principals were asked to note outstanding and exemplary educational leaders who had taught for at least 5 years in school in Trinidad and Tobago. Principals were also asked to rank the list on the following criteria: personal knowledge of and experience with them as a means of verification; their impact on emerging leadership; the contributions each made nationally; and whether they had previously shared their stories formally. The list was then sorted according to gender.

For purposes of this paper, the testimonies of the two most highly ranked participants are being shared. Given the constraints in terms of space and scholarly writing, using a small sample of two participants afforded the researchers an opportunity to share the stories and messages of these two exemplary women educational leaders without sacrificing too much of the rich narrative gained from the oral history method.

Following the ranking of possible participants, the primary researcher contacted them by telephone, then by letter to ascertain their willingness and readiness to be interviewed. The interviews were conducted at a location and time that were convenient to the participants over the course of one year.

Data collection

Data were collected through tape recorded interviews, during which the

participants were encouraged to share their stories completely and honestly (Nielsen, 1990, p. 101). Two 45-minute interviews were initially planned with each participant, but in reality the interviews were no less than an hour each. Audio recordings and transcriptions wee completed by the primary researcher. Narratives were developed through a process of transcribing and editing the data. For enhancing credibility, we used member checking (Merriam, 1998). Copies of transcripts were shared with participant interviewees for feedback and to accommodate any amendments they wished to make. One participant expressed concern about confidentiality and made suggestions to facilitate her anonymity. Initial pseudonyms were determined in collaboration with the participant interviewee.

Data analysis

The constant comparison method cited in Lincoln and Guba (1985) was used for data analysis. This method combines inductive category coding with a simultaneous comparison of themes or constructs observed. The narratives were coded, classified, and systematically and continuously compared across categories. Data analysis included: (a) initial review of all narratives, including reflective and field notes; (b) corrective feedback from the participants; (c) grouping of answers to the guiding questions and prompts; (d) noting the common and different perspectives of each interview on central issues; (e) coding the transcripts to reflect the major emerging constructs and themes; and (f) review of narratives, constantly identifying and establishing or sometimes changing links between constructs. Finally, the common and unique constructs and themes were identified and analyzed for messages pertaining to the purpose of the study and linking to the research field.

Findings

Lady Elvira is a former head of special education services, and a pioneer of social welfare and education services in the Caribbean. She is a recipient of an honorary doctorate from the University of the West Indies; the National Public Service Medal of Merit (Gold) for Community Services; the Principal of the Year Award; Individual of the Year Award; and the Woman of Caribbean Award; and has also been honored by the President's (U.S.) Committee on Mental Retardation.

Experiencing Leadership

Lady Elvira attributed much of her leadership style to growing up in a family dominated by boys. "I also felt equal to them in that we all were expected to do well." Her early work with children at the psychiatric hospital influenced her pursuit of studies in Residential Care of Children, Social Policy and Administration, and Business Administration. Perceiving her complete recovery from a stroke as a "miracle of faith," Lady Elvira extended her philanthropic efforts. She journeyed from volunteering at to directing the Special Education Services in the Ministry of Education.

As a woman in leadership. Lady Elvira claimed a late awakening to appreciating the role and responsibilities of women as leaders. she did not recall any significant experience where she felt intimidated because of her gender and celebrated her collaboration with men. She stated, "Too often we women subvert male leadership and men in general, rather than enjoy the reciprocal dimension of male/female relationships."

Lady Elvira identified the importance of mentors and models to her success. They came in either gender, but she identifies her mother for special mention: "My mother went to university at age 60."

Leadership challenges. Lady Elvira accepted that she had many challenges with the "bureaucracy" including getting the established special education service accepted as "part of the Ministry of

Education and attracting teachers." A related challenge lay with the recruitment of men.

Perspectives on Leadership and Women

Lady Elvira conceptualized that leadership is the acceptance of a responsibility for a cause that transcends ordinary love; it must be a "higher calling" that motivates one to bridge a gap between a need and a resource. She did not identify any special attributes of her leadership as related to her gender and rejected any construct of "feminism" that might suggest denigrating men. She explained, "We never talk about the women who violate men. We forget, too, that in the discourse [with men about equity in sharing and responsibility] we have tried to take away what is...family headship." Speaking from the perspective of a Caribbean woman who has been on the front lines as academic and social liberator, Lady Elvira celebrates the power of "femininity as feminism." She clarified, "A man would respect him as a man. I would be able to enjoy him doing the things I believe a man should do and vice versa."

Recognizing the increasing number of women in the profession and their eventual assumptions of leadership, Lady Elvira warned that being in a position of leadership or having qualifications in leadership is not synonymous with effective leadership. She rationalizes, "We have to be continually reviewing, determining what it is about you that makes people want to follow."

She described herself as "firmly grounded" and "deeply spiritual." She sees God reflected in everyone through caring dispositions. She challenged the notion, pervasive in the Caribbean, that caring is a feminine attribute. She explained, "You associate nurturing with children and women. A man who is seen as caring runs the risk of being perceived as effeminate."

Lady Davina – Preparing Others for the Front Line

Lady Davina, MA, was honored with Trinidad and Tobago's Medal of Merit (Gold). She has given her life's service to the educational community nationally and regionally. She began her career as an elementary school teacher at her alma mater and moved on to lecturer, dean and principal of the combined Teachers College. She continues her contribution to the community through her involvement in the church and as a connoisseur of the local culture.

Experiencing Leadership

Lady Davina identified her mother as her first leader and mentor, who ensured that from an early age she had a "very responsible" childhood, being initially one girl among five boys. She recalled, "I got preferential treatment, which means I got many more 'don'ts' than 'do's.'" Whereas her brothers were sent to school regardless of the circumstances, she was kept home from school at times to help with her ailing grandmother.

Paths to leadership

For Lady Davina, her path to leadership involved a complex mixture of readiness skills being developed from elementary to university education. Thanks to the tutoring of her mother, she was an avid reader: "By age 5, I could read anything." She recollected, "I was fortunate to have a lady teacher. [She] was among one of the first women into pan and folk music. She was a pianist, pannist, and the first woman to start a panside."

Many of her stories centered on punishment; not that she was particularly troublesome, but because the emphasis in her home was on discipline. Her secondary education reinforced her leadership potential through a broad curriculum with its focus on the history of the school, culture, and a sense of responsibility for persons and things.

Models and Mentors

Lady Davina valued the mentors of either gender in her professional evolution. She singled out three male mentors and one female colleague for very special mention. There was Mr. McK, her former teacher, teaching colleague, supervisor, and advisor. She predicted, "Friday afternoons he will have the staff socializing."

She also described Father C, a parish priest, who laughed easily. "He saw my potential and had a considerable effect on me and by extension [on] my relationship with protégés." Another mentor was Mr. B, with whom Lady Davina worked in her early days as the teachers' college lecturer. She reflected, "He was open-minded and truly collaborative – a person whose style and whose opinions were respected."

Leadership

For her, the challenges she faced were personal. Her most significant challenge was feeling unable to or uncomfortable with efforts to engage in "small talk." "I was not the kind of person who could [just] relax and *lime* [to socialize for the fun of it] like some people can. One might say I was a workaholic…you have to learn to relax and socialize."

Lady Davina described her commitment to leadership as sincere and responsive, which was shaped by her teachers and schooling. She said, "I was truly cared for, and I cared and still care for my students and protégés." Among her primary achievements were the residential teachers' college students she nurtured. She noted, "Residential training made them [the student teachers] blossom; even those who have left teaching have carried that spirit into their various walks of life."

Perspectives on Leadership and Women

Lady Davina conceptualized leadership as service and commitment to the community. This sense of commitment must be addressed in educational leadership and teacher preparation programs. She recommended a residency requirement combined with community service for preservice teachers, such that, "We would go every year and put on a concert, and get the inmates [children patients of a psychiatric hospital] to join in."

According to Lady Davina, there were some essential elements to any successful teacher/leadership effort, including the following: (a) a vision of what teacher training is; (b) high self-esteem of those being trained; and (c) consideration, concern, and respect for the students. She spoke of the importance of communication skills training as a means "to improving the ability to express themselves…to care about one another…students, their families…and [to value] the role the family plays."

She contended that the status of teaching is not only shaped by the policymakers but by the quality of teachers recruited and their preparation, which in turn determines how teachers are valued by the community. She recalls, "When I was a child, I longed to be a teacher; I looked up to my teachers. Nowadays, children don't hear their parents and their elders celebrating teachers."

Lady Davina shared that her perspective on men and women in leadership may be related to societal expectations and gender roles. She said, "people have a feeling that men are heady [logical], more intellectual in their leadership, whereas women are more emotional and what one might call affected, both effective and affectionate." She warned, however, that we must be cautious about the assumption of men being less responsive. In her experience, "There are…caring men. Some give the impression that he couldn't care less, although probably deep down inside they probably do [care]."

Lady Davina recognized that women are gaining more positions of leadership, despite the pervasive notion that they are the weaker sex. She identified the broad experiences and academic curricula inclusive of home management, cooking, and caring responsibilities made available to

women over the years as the catalysts. Lady Davina spoke about the need for clear roles for women in leadership. "Women...have a very difficult role to make the men realize that...[women leaders] are not there to dominate; [but] to complement."

Lady Davina identified herself as a feminist, and offered some clarification. She said, "A feminist is concerned not just about women, but about children and men. A feminist brings out the best in womanhood." Lady Davina suggested that women should revisit their interpretation and definition of feminism to be an assertion of love for themselves, which is not synonymous with excluding or denigrating men.

Discussion

Trinidad and Tobago, the southernmost of the Caribbean islands, has been colonized by the Spanish and British, and significantly influenced also by the cultures of France, India, Syria, and its connections through slavery to western Africa. The legacy of colonial Britain, handed down through the educational models, characterized schools as agencies of social control, facilitated by a small male elite. An important objective of education then was the realization of the large majority as a compliant working class.

In such a context, men served as the leaders, missionaries, educators, and administrators. Women who served in education were selected primarily for their nurturing roles. Campbell (1992) links the presence of women in the education system with a shift from primarily a traditionalist industrial male-dominant system to one more characteristic of the interests and needs of the broader population. Concurrent with this change was the inclusion of needlework in the curriculum and women in the infant department. Women were increasingly accepted and welcomed into the schools and paid less, even with qualifications superior to those of their male counterparts (Campbell). However, they were isolated or excluded in their evolution as administrators through "deliberate as well as unconscious attempts" (Taylor, 1997, p. 184).

Taylor (1997) explores the phenomenon of exclusion and isolation among women in educational leadership. He however recognizes a trend toward increased representation of women in educational leadership at the elementary school level and proposes a "conscientisation and mobilisation of women" (p. 196), the establishment of mentoring relationships, and more incisive research as a key strategy for effectively addressing the trivialization of women's contributions. It is in the context of Taylor's recommendations and the absence of any systematic attempt by the State to address the non-legitimization of women educational leaders, that this study was conducted.

The narratives of our participants show a path of leadership through individualized journeys and experiences from family, schooling, and early professional development. Four common themes emerge from the analysis of the narratives. These include: (a) the development of leadership characteristics among these women as an evolutionary process involving a consistent environment and presence of an orientation toward achievement; (b) a sense of community and of experiences that include caring and being cared for; (c) regard for equity, inter-relatedness, and gender; and (d) approaches to responsibilities that reflect a recognition of a higher order and interconnectedness between leader and follower.

Despite these four emergent themes, the narratives also reveal the differing styles of Lady Elvira and Lady Davina. The former is portrayed as the leader at the front line, a force to be reckoned with, a director, a fighter, one who mobilizes for and provides opportunities for professional and leadership development. Lady Davina is presented as being less directive, more overt in her nurturing style, a negotiator, leading at the side.

Leadership as Developmental

Lady Elvira and Lady Davina characterize leadership as an evolutionary and a social process involving preparation, appreciation for followers and the community, and an approach to responsibilities that reflect moral awareness. Both participants construct leadership in a way that incorporated their journeys through childhood with their personalities, needs, and relationships with followers and mentors who all celebrated academic achievement and service to the family and community. The narratives for Lady Davina are particularly rich with childhood experiences. Their evolution as leaders is intricately intertwined with their sense of purpose as learners and leaders, with Lady Elvira having an early sense of personal and professional development. Both women addressed organizational constraints through networking, flexibility, intimacy, being personable, and personal growth associated with transformational leadership (Bass, 1998).

Lady Elvira and Lady Davina value mentors and models, particularly their mothers. For Lady Elvira, even while in her 50s, her mother was actively engaged in her academic life as model and encourager. Lady Davina's mother was also active in shaping and nurturing her. Both mothers helped shape their daughters to be independently minded women. The character of their mother figures lends evidence to the importance of a consistent environment for emergent leaders when they are young, especially one with a clear understanding of what is, or is not, acceptable. The mothers of the participants also share a value for education, as noted in studies about the role of mothers by Cantor and Barney (1992). With only one of the mother figures of the participants being educated, educational attainment of the mothers does not, however, figure prominently, as in the findings of Shakeshaft (1987).

The narratives of Lady Elvira and Lady Davina challenge findings by Cantor and Barney (1992) that successful female leaders tend to grow up in two-parent families. Instead, the experiences of our participants endorse the findings of Clay (1997) that single mothers constitute powerful motivating influences over their daughters.

Through appropriate models Lady Elvira and Lady Davina gained the support, encouragement, friendship, sponsorship, career guidance, and knowledge that facilitated their successes as educational leaders. Though the roles of mentors were valued, regardless of their gender, it is evident in the narratives that for these participants, women and mother figures were their primary mentors.

Sense of Community

The participants recognize and pay tribute to the communities that nurtured them. Lady Davina's community was the residential facility where she taught, administered, and led. Her concept of communal responsibility extended to her church. In that learning community she was often referred to as "Ma" and "Tantie," an indication that her protégés cherish her nurturing leadership. Lady Elvira invested considerable time with philanthropic efforts and remains involved in a broad assortment of social and professional agencies, serving in most of them as an executive officer. For her, the community extended from her family to the nation and the region's underprivileged women and children in particular.

Lady Elvira and Lady Davina model a style of leadership where followers are valued. Through a readiness to listen to the opinions and feelings of their followers and to be accessible and accommodative of divergent views and needs, collaboration and community are identified as important elements in the leadership style and constructs of these women educational leaders. They epitomize a regard for leaders and followers, regardless of gender, one that nourishes the sense of community. These women educational leaders epitomize

interdependence, and created and maintained positive relationships with their communities (Cantor & Barney, 1992).

Both participants were grounded – centered within their communities' needs, concerns, cultural and socio-economic contexts and resources. It is within this centeredness in the community that their motivation and sustenance as leaders thrive. They are seen as participants, accountable and valued by all stakeholders within their learning communities. This sense of partnership given from community stakeholders carries more influence than that of the State's bureaucracy. Such leaders, while not necessarily appearing adversarial or noncompliant to the State's mandates as implementers of policy, actively serve the interests of the communities first.

Equity, Interrelatedness, and Gender

Each participant recognizes the contributions of women in leadership, with concerns for equity and equality. Sharing perspectives that women have made and continue to make to leadership, primarily due to socialized roles and expectations, each participant argues for greater collaboration between men and women leaders, and recognition that equity and equality are cross-gender issues (Taylor, 1997).

Lady Elvira and Lady Davina acknowledge that they faced challenges being women in educational leadership, but they downplayed the existence, entrenchment, or patriarchy of a male hegemony. Lady Elvira and Lady Davina recognize aspects of their style as being representative of their experiences in dealing with their brothers, who set the standard and provide many opportunities for experience in negotiation and problem solving. Neither of the participants took positions on the worthiness of female mentors as opposed to male mentors. Lady Elvira's key to working with men was her forthrightness, whereas for Lady Davina it was her flexible readiness to network and orientation to service.

Moral and Spiritual Awareness

Lady Elvira gives no detail about the role of the church and early education in her evolution as a leader. Whereas the narrative speaks more about religion than her moral awareness, she does afford a framework of self-descriptors as being "firmly grounded" and "deeply spiritual." She notes that for her "sharing is loving" and that it is the purpose of life. She expressed a concern too for a heritage of values and standards that were not just materialistic or competitive but mindful of a higher order, to which we are accountable: "God did not make Eve and Eva."

Lady Davina remembers her mother as a very religious person, being a Methodist by upbringing and philosophy and instilling this philosophy in her children. She recalled the beauty of her mother singing hymns all day over the washtub. She places great emphasis on mutual respect for all and service to the community of followers and leaders alike. She speaks of Jesus as a model of a caring leader, noting that sensitivity, responsibility, and responsiveness are all aspects of caring leadership.

These indicators, the participants' value of service and attitude toward the community of individuals and a higher calling, illustrate moral awareness and spirituality, which is considered fundamental to transformational, caring, authentic leadership (Gilligan, 1982). Morality is not analogous with religion, but is more akin to spirituality and a non-partisan sensitivity to deep and enduring meaning and interconnectedness to something greater than the self (Duignan & Bhindi, 1997). Spirituality attests to a readiness to goodness, through helping others and concern for relationships and communication (Gilligan).

Caring is associated with one's mission, experiences, and connectedness to the divine. Caring was referred to in the construct as "critical," a "lifelong process" synonymous with a concern for another person's feelings and having a responsibility for his/her optimum growth, and related to

motherhood, which was not limited to the role of childbearing.

The participants shared concerns about the apparent "decline of caring and spirituality in the contemporary world, and the tendency by some to see caring as a feminine attribute typified in nursing and infant and special education, and associated with non-competitive salaries." The participants hoped that caring leaders would be identified and accepted as models and that career counseling and discussion about the need for caring leadership and caring professional practice might encourage more young people, particularly men, to enter the field.

These exemplary women express their feelings, live life to the fullest, and care deeply for people. This study recognizes and documents the contributions and roles of these two women educational leaders. Further, the study shares the experiences and perspectives of these exemplars with regard to establishing and maintaining community connectedness; a critical bridge that keeps relationships alive and well within educational communities.

There are important lessons to be learned from the life testimonies of women educators who successfully evaluate, translate, and transform personal and professional barriers.

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Exploratory Study of a Tool to Promote Preservice Teachers' Reflection on Students' Science Knowledge

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Current reform efforts in science education strongly advocate instruction that helps students to construct personally meaningful science knowledge. Accordingly, science teacher educators seek to provide experiences that (a) enable science teachers to understand how students might perceive science in their daily lives and (b) encourage science teachers to develop student-centered approaches to instruction. This paper describes an exploratory project aimed at identifying what effect a science photo album (developed by 6th grade students) might have on preservice teachers' reflection on students' everyday science knowledge and consideration of student-centered instruction. Eight preservice teachers were asked to complete a course creation exercise on genetics. Four teachers, comprising the experimental group, completed the exercise using the student developed science photo album. The control group completed the exercise without any aid. Findings suggest that the experimental group was more mindful of students' science knowledge when completing two of three parts of the course creation exercise.

INTRODUCTION

As constructivist learning theories have become widely accepted among science educators (Tobin, 1993), there has been a growing interest in providing science instruction that helps students construct personally meaningful science knowledge (Hatzinikita, Koulaidis, & Hatzinikitas, 2005). Both the National Science Education Standards (National Research Council, 1996) and Benchmarks for Scientific Literacy (American Association for the Advancement of Science, 1993) stress the importance of providing curriculum and instruction that build on students' everyday experiences in an effort to make science personally meaningful. This suggests that teachers and curriculum developers have a sense of what science knowledge students bring with them to the classroom. Although teachers are expected to take an often decontextualized science curriculum, transform it and deliver personally meaningful instruction to students, it is not clear what tools and resources are needed to meet this challenge. There is a significant body of work that examines teachers' science knowledge as a factor shaping the type of science knowledge that students develop (e.g., Laplante, 1997; Rubba & Harkness, 1993; Traianou, 2006). Others, however, challenge the assumption of a direct relation between teachers' science knowledge and students' science knowledge (Lederman, 1999; Zoller & Donn, 1991), even reporting inconsistencies between teachers' and students' science knowledge (Tsai, 1999). Lederman found that among the most critical factors that affect classroom practice were teachers' expertise and teachers' perceptions of students but not necessarily teachers' own knowledge of science.

The challenge of helping students construct personally meaningful science knowledge is complicated by the fact that some teachers tend to have constrained views of student-centered instruction. In a study of beginning teachers, Simmons et al. (1999) concluded that many beginning teachers mistakenly view their practice as student-centered when classroom observations reveal

that their instruction is primarily teacher-centered. Beginning teachers graduate from teacher education programs holding idealistic, student-centered views about instruction, but are unable to turn those ideas into practice. Further, Simmons et al. asked their sample of beginning teachers the following two questions: "How do you learn best?" and "How do your students learn best?" The majority of teachers responded that their students learn the same way the teachers themselves learn, which suggests that teachers may be imposing their views of themselves as learners on their students. As a result, the process of negotiating meaning between teachers and learners critical to constructivist pedagogy (Tobin & Tippins, 1993) is somewhat neglected. Taken together this work indicates that, although beginning science teachers agree with current science education reform efforts and recognize the importance of providing student-centered science instruction, they may not have a strong sense of the science knowledge students bring to class, nor of how to build on that knowledge to help students construct personally meaningful science knowledge. Teacher education programs, then, should provide experiences through which preservice teachers could (a) develop insight into how students perceive science in their daily lives; and (b) develop student-centered approaches to instruction.

In this exploratory project, we set out to determine what effect a science photo album (developed by sixth grade students) might have on preservice teachers' reflection on students' everyday science knowledge and consideration of student-centered instruction. The project was conducted in two phases. First we developed an instructional tool that could be used by science teacher educators to encourage preservice teachers to think in terms of students' everyday science knowledge. Second, we conducted an experimental investigation that involved preservice science teachers in an open-ended course creation exercise. The control group completed the exercise without any aid, whereas the experimental group used the instructional tool while completing the exercise. This paper describes the instructional tool that we developed, reports the results of the investigation, and discusses implications for further study.

Method

Development of the Instructional Tool

The instructional tool developed in this project is a photo album that consists of samples of student generated photographs, as well as researchers' summaries of the photographs. As part of data collection for a larger research project (Lewis, 1998), the first author gave disposable cameras to four sixth-grade girls and asked them to take photos of things that make them think of science. Students returned 45 science photographs. Upon return of the photographs the first author interviewed students using the photographs as elicitation devices. The purpose of these interviews was to gain greater insight into their views of science and also to ascertain why the objects depicted in the photographs connoted science.

Photographs were later analyzed for content, and sorted into six categories: nature, technology, people, doing science, science content, and abstractions. The *nature* category consists primarily of photographs of trees and plants; there are also pictures of the sky, birdhouses, and other nature items usually depicted among trees and plants. The *technology* category includes photographs of household appliances, and electronic devices. The *people* category consists of candid shots of teachers and classmates in non-science settings. The *doing science* category contains photographs of settings where science is done and people in those settings. Among these are photographs of friends, teachers and others in science settings. These photographs of people differ from the *people* category in that it is the people *and* the setting that "makes me think of science." For example the first author appears in a few photographs as "the science professor, the one who tapes science class." Science *content* photographs include pictures where science products are represented. This includes items such as science textbooks, students' notebooks, notes and formulae on the chalkboard. The final category, *abstractions*, consists of a photograph

that could not be placed in the other categories. During interviews the student who took this photograph was unable to explain why it connoted science. She explained that, "it just looks 'sciency' to me."

The final photo album consists of 21 pages and begins with an introductory statement on the importance of students' prior knowledge followed by a description of the photo album and an explanation of how the photographs were generated. The remainder of the album is organized into six categories mirroring the content of the photographs. For each category there is a heading and a description of the pictures that comprise that category. This page is followed by one to three sample photos from each category. Representative photos were selected from the pool of 45 to reduce redundancy. Photos were chosen primarily on the basis of clarity and quality of the image. The final album contains 13 photographs.

Participants

Could a pictorial summary of students' science knowledge serve as a reflection aid enabling teachers to identify and develop more student-centered approaches to instruction? To answer this question we set up an experimental investigation using a posttest-only control group design (Krathwohl, 1993). Eight preservice teachers were randomly assigned to one of two groups: 4 teachers were assigned to the control group and 4 to the experimental group. Of the 8 preservice teachers participating in the study, 6 earned their BS degree in biology and are seeking certification to teach high school biology. Of the 2 remaining teachers, one earned a BS degree in chemistry and seeks certification in high school chemistry; and the other earned a BS degree in geology and seeks certification in middle school earth/space science. Both non-biology teachers were members of the experimental group.

The group consisted of 6 females and 2 males evenly distributed across experimental and control groups; there was one African American, and the remaining students were Caucasian. All teachers were asked to complete a three-part *Course Creation Exercise*. The experimental group used the instructional tool to complete the exercise while the control group completed the exercise without the tool. At the time of the investigation the 8 preservice teachers were working to earn Masters of Arts degrees in science education. The lead author, a methods instructor for these teachers, invited them to participate in the study.

Data Collection

The Course Creation Exercise opens with a *background statement* on the importance of students' everyday knowledge. The statement is:

> Children enter science class with a considerable measure of science knowledge gained from previous classes and experience. Successful science instructors use this knowledge as a resource for introducing new science concepts.

Following this statement is a *summary explanation* of the exercise.

> You are presented with the assignment of developing a course on Genetics for middle/upper class sixth grade girls. To begin writing your course, you will complete three tasks (a) *brainstorming ideas*, (b) *writing objectives*, and (c) *developing activities*. To complete these tasks please follow the directions given below. <u>The photo album contains pictures of "Things that make students think of science." Read through it before beginning the exercise. You may use it as a resource to help you complete the exercise.</u>

The underlined text was included in the summary explanation given to the experimental group. It was omitted from the summary explanation given to the control group. Following the summary explanation, the Course Creation Exercise directed teachers to complete three tasks: *Brainstorming Ideas, Writing Objectives,* and *Developing Activities*. In the first task, Brainstorming Ideas, teachers were instructed to "Make a list of ideas that students might have (prior to your course) that would help them to understand your course on Genetics." The second task, Writing Objectives, instructed teachers to "write a list of objectives

that describe how students should or could apply their knowledge of genetics, learned in your course, to their everyday lives." The third task, Developing Activities, instructed teachers to "Describe 3 activities that you could use in your course on Genetics." The entire exercise took 30-60 minutes to complete.

Data Coding

Prior to data analysis, the authors discussed and tried several methods of analyzing the responses with samples of the data. Through this process we developed the sorting criteria described below. We coded all responses to the three tasks independent of one another and without knowledge of the data source. After coding all items we discussed discrepant items until we arrived at agreement on sorting. There was over 95% initial agreement on sorting across all three tasks. All discrepant items were resolved so that there were no ungrouped responses. Any items that were not informative enough to be categorized were omitted from consideration. In the first task, Brainstorming Ideas, responses were grouped as either *everyday science knowledge* (ESK) or *school science knowledge* (SSK). If (from our judgment) the response was an idea that students would likely get from everyday experiences, then we rated it as everyday science knowledge (ESK). If it was more likely that the idea was one that students would get from prior instruction, then we rated is as school science knowledge (SSK). The first guide we used in rating these items was the source of the information. Ideas that were more likely garnered from students' friends and family, popular media, and students' observations were rated as everyday science knowledge. The second guide was the terminology used to express the idea. Ideas that were expressed in more scientific terms were rated as school science knowledge, whereas ideas expressed in everyday terms were rated as everyday science knowledge. Table 1 provides some examples of teachers' responses and our rating choices.

Table 1

Examples of Responses to Task #1 - Brainstorming Ideas

Students' ideas prior to instruction	Rating	Reason
"Children have similar DNA make-up as their parents (can be used for paternity tests)"	School science Knowledge	Terminology
"Children have traits from both mom and dad"	Everyday science knowledge	Terminology
"There are a number of genetic mutations"	School science knowledge	Source/Terminology
"Sometimes a fluke can happen: two normal colored parents can have a child with albino characteristics"	Everyday science knowledge	Source

In the second task, Writing Objectives, objectives were grouped as either *student centered objectives* (SCO) or *content centered objectives* (CCO). The instructional tool was intended to help teachers reflect on students' everyday science knowledge. So, it seems reasonable that in doing so they would be able to hypothesize desirable *connections that students could make* between everyday science knowledge and school science. Therefore objectives that either foster a personal connection between students and the content or include students' everyday knowledge, or their out of school resources were rated as student centered. Objectives reflecting content knowledge abstracted from students or independent of students' everyday knowledge were rated as content centered. Table 2 provides some examples of teachers' objectives and our rating choices.

Table 2

Examples of Responses to Task #2 - Writing Objective

Objectives describing application of genetics to students' lives	Rating	Reason
"Apply information learned about genetics to interpret traits inherited from one generation to the next"	Content centered	Abstracted from student
"Trace traits of ancestors to determine the family tree and conclude their relatives on basic traits passed along the family line"	Student centered	Involves the students' family
"Gain deeper understanding of the Human Genome Project and its possible effects on the future"	Content centered	Abstracted from student
"Explain how science or how 'we' can use genetics to 'our' benefit (i.e., making of insulin and making of hybrid plants) Genetic Engineering"	Student centered	Stresses students involvement "we" and "our"

In the third task, Developing Activities, activities were grouped as either *personalized* (PER) or *abstracted* (ABS). Personalized activities were those activities that either drew on or involved students' everyday knowledge, experiences, or surroundings as a basis for science instruction. By contrast, abstracted activities were those that were depersonalized and largely unrelated to students' everyday knowledge, experiences, or surroundings. This task enabled us to discern the degree to which the instructional tool encouraged teachers to envision curriculum and instruction that *draws from students' everyday science knowledge* in teaching school science. Therefore we noted activities that required students to rely on their everyday science knowledge for completion. Table 3 provides two examples of teachers' responses and our rating choices.

Table 3

Examples of Responses to Task #3 - Developing Activities

Activities that could be used in a genetics course	Rating
"Expression of Genes" Have students determine whether they have dominant (Dd or Dd) trait or recessive (dd) trait expressed Ex crooked finger, eye color, widow's peak, etc.	PER
Using jellybeans and cups, students will do 100 crosses to determine genotype and phenotype ratios. Take 4 opaque plastic cups and each cup represents an allele pair. Two cups per parent. 10 jellybeans in a cup. If the parent is heterogeneous for one trait the cup will have 2 different colors. The same colored jellybeans represent the same gene. For example, if we did a cross of RrQq X RRQq, cup 1 would be 5 red for R and 5 pink for r. Cup 2 would be all red. Cup three would be five orange for Q and five yellow for q. Cup 4 would be the same. The girls would pull one jellybean from cup one, one from cup 2, one from cup 3 and one from cup 4. They then determine phenotype and genotype. Pull the jellybeans back and repeat and repeat. Each pair of girls will have a different cross. We will get ratios and talk about the ratios.	ABS

Once all items were coded, each preservice teacher was given a score on each of the three activities. The score represents a percentage of responses. For example, Teacher C gave seven responses to the Brainstorming Ideas task. Of those seven responses, four were coded ESK; hence Teacher C's ESK score on the Brainstorming Ideas task was 57%. Table 4 provides scores for all 8 teachers across all three tasks.

Table 4

Teachers' Scores across All Three Tasks

Group	Teacher	Brainstorming ideas (ESK Score)	Writing objectives (SCO Score)	Designing activities (ESK Score)
Control	A	0%	0%	33%
	B	29%	0%	33%
	C	57%	9%	100%
	D	33%	0%	0%
Experimental	E	54%	20%	100%
	F	100%	29%	100%
	G	100%	20%	33%
	H	67%	57%	67%

Data Analysis

Data were analyzed using two statistical tests: the Mann-Whitney U test and the Spearman rank order correlation coefficient. The Mann-Whitney U test was used in this study to determine the degree to which teachers' completion of the course creation exercise varied by treatment and also by teachers' area of certification. The Spearman rank order correlation coefficient was used to determine the relationship between the three tasks of the course creation exercise. These tests were chosen because they are ideally suited for studies that examine two independent samples, use a small sample, and use a measure that is, at most, ordinal (Siegel & Castellan, 1988). These are all characteristics of the present study.

Findings

To what degree did use of the tool enable teachers to better identify and develop student-centered approaches to instruction? The final results for the comparison of teachers' performance by treatment group and by area of certification are presented in Table 5. Findings show that on the first task, *Brainstorming Ideas*, teachers in the experimental group were more likely to identify students' everyday science knowledge (ESK). Similarly, on the second task, *Writing Objectives*, teachers in the experimental group were more likely to write student-centered objectives (SCO). On the third task, *Developing Activities*, there was no significant difference between treatment groups.

Table 5

Mann-Whitney U Results by Treatment Group and Certification across All Three Tasks

		M	Sum of ranks	Mann-Whitney U	Z	Sig. (2-tail)
ESKPERC	Control	2.50	10.00			
	Experimental	6.50	26.00			
	Treatment			1.000	-2.033	.042*
	Biology	4.08	24.50			
	Non-biology	5.75	11.50			
	Certification			3.500	-.838	402
SCOPERC	Control	2.50	10.00			
	Experimental	6.50	26.00			
	Treatment			.000	-2.381	.017*
	Biology	3.92	23.50			
	Non-biology	6.25	12.50			
	Certification			2.500	-1.203	.229
PERPERC	Control	3.50	14.00			
	Experimental	5.50	22.00			
	Treatment			4.000	-1.214	.225
	Biology	3.67	22.00			
	Non-biology	7.00	14.00			
	Certification			1.000	-1.752	.080

A secondary finding in the study is the relationship between *Brainstorming Ideas* task and *Writing Objectives* task. Table 6 shows the result of Spearman's correlation between teachers' performance on each of the three course creation tasks. There is a fairly high correlation (r=. 834, p<. 005) between teachers' abilities to identify everyday science knowledge in the brainstorming task and their abilities to write student-centered objectives in the writing objectives task. Again however, there is no relationship between the *Developing Activities* task and either of the first two.

Table 6

Spearman's Correlation between All Three Tasks

		ESKPERC	SCOPERC	PERPERC
ESKPERC	r	1.00		
	p	-		
SCOPERC	r	.834**	1.00	
	p	.005	-	
PERPERC	r	.453	.619	1.00
	p	.130	.051	-

** Correlation is significant at the .01 level (1-tailed)

* Correlation is significant at the .05 level (1-tailed)

These findings provide a fairly strong indication that providing the student developed photo album to teachers encouraged them to be more mindful of students when planning instruction. It is not clear why the observed mindfulness of the experimental group did not extend to the *Developing Activities* task, which is important in that it is the one task of the three that is closest to instruction. Additionally, the fact that there is no relationship between the *Developing Activities* task and either of the first two (*Brainstorming Ideas* or *Writing Objectives*) could suggest a number of explanations. First, it could be that for the teachers completing this task, developing course activities is a fundamentally different activity than brainstorming ideas or writing objectives. This conclusion seems plausible in that, conjuring ideas students might have or identifying objectives toward which they might teach could be seen as somewhat more academic. In contrast, teachers may regard actually developing activities as a more concrete task of determining what to do with students on a given day. A second explanation could be that the *Developing Activities* task of the course creation exercise was poorly designed. This third task differed from the first two tasks in that it fixed the number of responses teachers could give. Teachers were instructed to "Describe 3 activities." Consequently, there was much less variability in teachers' scores on this task. So, limited variability in scores coupled with the small sample size might explain the lack of relationship between this task and the first two.

Conclusion

While the findings presented here may be encouraging in a sense, we urge caution and stress the exploratory nature of the present study. The sample used is fairly small; and although we adopted methods of analysis suitable to the sample size, generalizations from this study are premature. Additionally, although the treatment groups were randomly assigned, 2 of the 8 teachers were non-biology majors and both were assigned to the experimental group. Because the Mann-Whitney U test revealed that there was no significant difference between the biology majors and the non-biology majors on any of the three tasks, we are confident that this sampling distribution did not affect the final results. However, the distribution still gives us reason to be cautious.

These findings do, however, point to an instructional methodology that merits further investigation. The idea that providing preservice teachers with some artifact from K-12 students causes them to be mindful of those K-12 students, does not require a conceptual stretch. It is in fact quite intuitive. As such, there is likely a wide range of artifacts that would fill the role of the photo albums used in this study. Examples would be student generated narratives (Cobern, Gibson, & Underwood, 1999), essays, questions, interviews, and artistic representations. Future studies might investigate the impact of various types of artifact exposure and the types of mindfulness that those artifacts encourage. For example, are there student-generated artifacts that encourage teachers to envision more culturally responsive (or gender sensitive) instruction? In light of Simmons et al. (1999) findings that teachers impose their views of themselves as learners on their students, it might be worth asking if there are artifacts that help preservice teachers to develop more realistic views of students as learners.

Additionally, while the course creation exercise proved to be a convenient tool in this project, the ultimate goal of exposing teachers to various artifacts is to impact practice. Hence, it is important to also examine the impact of artifact exposure on practice more directly than is done with the course creation exercise. As well, it would be important to examine the impact of long-term artifact exposure.

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Exploratory Study of a Tool to Promote Preservice Teachers' Reflection on Students' Science Knowledge

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Current reform efforts in science education strongly advocate instruction that helps students to construct personally meaningful science knowledge. Accordingly, science teacher educators seek to provide experiences that (a) enable science teachers to understand how students might perceive science in their daily lives and (b) encourage science teachers to develop student-centered approaches to instruction. This paper describes an exploratory project aimed at identifying what effect a science photo album (developed by 6th grade students) might have on preservice teachers' reflection on students' everyday science knowledge and consideration of student-centered instruction. Eight preservice teachers were asked to complete a course creation exercise on genetics. Four teachers, comprising the experimental group, completed the exercise using the student developed science photo album. The control group completed the exercise without any aid. Findings suggest that the experimental group was more mindful of students' science knowledge when completing two of three parts of the course creation exercise.

INTRODUCTION

As constructivist learning theories have become widely accepted among science educators (Tobin, 1993), there has been a growing interest in providing science instruction that helps students construct personally meaningful science knowledge (Hatzinikita, Koulaidis, & Hatzinikitas, 2005). Both the National Science Education Standards (National Research Council, 1996) and Benchmarks for Scientific Literacy (American Association for the Advancement of Science, 1993) stress the importance of providing curriculum and instruction that build on students' everyday experiences in an effort to make science personally meaningful. This suggests that teachers and curriculum developers have a sense of what science knowledge students bring with them to the classroom. Although teachers are expected to take an often decontextualized science curriculum, transform it and deliver personally meaningful instruction to students, it is not clear what tools and resources are needed to meet this challenge. There is a significant body of work that examines teachers' science knowledge as a factor shaping the type of science knowledge that students develop (e.g., Laplante, 1997; Rubba & Harkness, 1993; Traianou, 2006). Others, however, challenge the assumption of a direct relation between teachers' science knowledge and students' science knowledge (Lederman, 1999; Zoller & Donn, 1991), even reporting inconsistencies between teachers' and students' science knowledge (Tsai, 1999). Lederman found that among the most critical factors that affect classroom practice were teachers' expertise and teachers' perceptions of students but not necessarily teachers' own knowledge of science.

The challenge of helping students construct personally meaningful science knowledge is complicated by the fact that some teachers tend to have constrained views of student-centered instruction. In a study of beginning teachers, Simmons et al. (1999) concluded that many beginning teachers mistakenly view their practice as student-centered when classroom observations reveal

that their instruction is primarily teacher-centered. Beginning teachers graduate from teacher education programs holding idealistic, student-centered views about instruction, but are unable to turn those ideas into practice. Further, Simmons et al. asked their sample of beginning teachers the following two questions: "How do you learn best?" and "How do your students learn best?" The majority of teachers responded that their students learn the same way the teachers themselves learn, which suggests that teachers may be imposing their views of themselves as learners on their students. As a result, the process of negotiating meaning between teachers and learners critical to constructivist pedagogy (Tobin & Tippins, 1993) is somewhat neglected. Taken together this work indicates that, although beginning science teachers agree with current science education reform efforts and recognize the importance of providing student-centered science instruction, they may not have a strong sense of the science knowledge students bring to class, nor of how to build on that knowledge to help students construct personally meaningful science knowledge. Teacher education programs, then, should provide experiences through which preservice teachers could (a) develop insight into how students perceive science in their daily lives; and (b) develop student-centered approaches to instruction.

In this exploratory project, we set out to determine what effect a science photo album (developed by sixth grade students) might have on preservice teachers' reflection on students' everyday science knowledge and consideration of student-centered instruction. The project was conducted in two phases. First we developed an instructional tool that could be used by science teacher educators to encourage preservice teachers to think in terms of students' everyday science knowledge. Second, we conducted an experimental investigation that involved preservice science teachers in an open-ended course creation exercise. The control group completed the exercise without any aid, whereas the experimental group used the instructional tool while completing the exercise. This paper describes the instructional tool that we developed, reports the results of the investigation, and discusses implications for further study.

Method

Development of the Instructional Tool

The instructional tool developed in this project is a photo album that consists of samples of student generated photographs, as well as researchers' summaries of the photographs. As part of data collection for a larger research project (Lewis, 1998), the first author gave disposable cameras to four sixth-grade girls and asked them to take photos of things that make them think of science. Students returned 45 science photographs. Upon return of the photographs the first author interviewed students using the photographs as elicitation devices. The purpose of these interviews was to gain greater insight into their views of science and also to ascertain why the objects depicted in the photographs connoted science.

Photographs were later analyzed for content, and sorted into six categories: nature, technology, people, doing science, science content, and abstractions. The *nature* category consists primarily of photographs of trees and plants; there are also pictures of the sky, birdhouses, and other nature items usually depicted among trees and plants. The *technology* category includes photographs of household appliances, and electronic devices. The *people* category consists of candid shots of teachers and classmates in non-science settings. The *doing science* category contains photographs of settings where science is done and people in those settings. Among these are photographs of friends, teachers and others in science settings. These photographs of people differ from the *people* category in that it is the people *and* the setting that "makes me think of science." For example the first author appears in a few photographs as "the science professor, the one who tapes science class." Science *content* photographs include pictures where science products are represented. This includes items such as science textbooks, students' notebooks, notes and formulae on the chalkboard. The final category, *abstractions*, consists of a photograph

that could not be placed in the other categories. During interviews the student who took this photograph was unable to explain why it connoted science. She explained that, "it just looks 'sciency' to me."

The final photo album consists of 21 pages and begins with an introductory statement on the importance of students' prior knowledge followed by a description of the photo album and an explanation of how the photographs were generated. The remainder of the album is organized into six categories mirroring the content of the photographs. For each category there is a heading and a description of the pictures that comprise that category. This page is followed by one to three sample photos from each category. Representative photos were selected from the pool of 45 to reduce redundancy. Photos were chosen primarily on the basis of clarity and quality of the image. The final album contains 13 photographs.

Participants

Could a pictorial summary of students' science knowledge serve as a reflection aid enabling teachers to identify and develop more student-centered approaches to instruction? To answer this question we set up an experimental investigation using a posttest-only control group design (Krathwohl, 1993). Eight preservice teachers were randomly assigned to one of two groups: 4 teachers were assigned to the control group and 4 to the experimental group. Of the 8 preservice teachers participating in the study, 6 earned their BS degree in biology and are seeking certification to teach high school biology. Of the 2 remaining teachers, one earned a BS degree in chemistry and seeks certification in high school chemistry; and the other earned a BS degree in geology and seeks certification in middle school earth/space science. Both non-biology teachers were members of the experimental group.

The group consisted of 6 females and 2 males evenly distributed across experimental and control groups; there was one African American, and the remaining students were Caucasian. All teachers were asked to complete a three-part *Course Creation Exercise*. The experimental group used the instructional tool to complete the exercise while the control group completed the exercise without the tool. At the time of the investigation the 8 preservice teachers were working to earn Masters of Arts degrees in science education. The lead author, a methods instructor for these teachers, invited them to participate in the study.

Data Collection

The Course Creation Exercise opens with a *background statement* on the importance of students' everyday knowledge. The statement is:

> Children enter science class with a considerable measure of science knowledge gained from previous classes and experience. Successful science instructors use this knowledge as a resource for introducing new science concepts.

Following this statement is a *summary explanation* of the exercise.

> You are presented with the assignment of developing a course on Genetics for middle/upper class sixth grade girls. To begin writing your course, you will complete three tasks (a) *brainstorming ideas*, (b) *writing objectives*, and (c) *developing activities*. To complete these tasks please follow the directions given below. <u>The photo album contains pictures of "Things that make students think of science." Read through it before beginning the exercise. You may use it as a resource to help you complete the exercise.</u>

The underlined text was included in the summary explanation given to the experimental group. It was omitted from the summary explanation given to the control group. Following the summary explanation, the Course Creation Exercise directed teachers to complete three tasks: *Brainstorming Ideas, Writing Objectives,* and *Developing Activities*. In the first task, Brainstorming Ideas, teachers were instructed to "Make a list of ideas that students might have (prior to your course) that would help them to understand your course on Genetics." The second task, Writing Objectives, instructed teachers to "write a list of objectives

that describe how students should or could apply their knowledge of genetics, learned in your course, to their everyday lives." The third task, Developing Activities, instructed teachers to "Describe 3 activities that you could use in your course on Genetics." The entire exercise took 30-60 minutes to complete.

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Table 5

Mann-Whitney U Results by Treatment Group and Certification across All Three Tasks

		M	Sum of ranks	Mann-Whitney U	Z	Sig. (2-tail)
ESKPERC	Control	2.50	10.00			
	Experimental	6.50	26.00			
	Treatment			1.000	-2.033	.042*
	Biology	4.08	24.50			
	Non-biology	5.75	11.50			
	Certification			3.500	-.838	402
SCOPERC	Control	2.50	10.00			
	Experimental	6.50	26.00			
	Treatment			.000	-2.381	.017*
	Biology	3.92	23.50			
	Non-biology	6.25	12.50			
	Certification			2.500	-1.203	.229
PERPERC	Control	3.50	14.00			
	Experimental	5.50	22.00			
	Treatment			4.000	-1.214	.225
	Biology	3.67	22.00			
	Non-biology	7.00	14.00			
	Certification			1.000	-1.752	.080

A secondary finding in the study is the relationship between *Brainstorming Ideas* task and *Writing Objectives* task. Table 6 shows the result of Spearman's correlation between teachers' performance on each of the three course creation tasks. There is a fairly high correlation (r=. 834, p<. 005) between teachers' abilities to identify everyday science knowledge in the brainstorming task and their abilities to write student-centered objectives in the writing objectives task. Again however, there is no relationship between the *Developing Activities* task and either of the first two.

Table 6

Spearman's Correlation between All Three Tasks

		ESKPERC	SCOPERC	PERPERC
ESKPERC	r	1.00		
	p	-		
SCOPERC	r	.834**	1.00	
	p	.005	-	
PERPERC	r	.453	.619	1.00
	p	.130	.051	-

** Correlation is significant at the .01 level (1-tailed)

* Correlation is significant at the .05 level (1-tailed)

These findings provide a fairly strong indication that providing the student developed photo album to teachers encouraged them to be more mindful of students when planning instruction. It is not clear why the observed mindfulness of the experimental group did not extend to the *Developing Activities* task, which is important in that it is the one task of the three that is closest to instruction. Additionally, the fact that there is no relationship between the *Developing Activities* task and either of the first two (*Brainstorming Ideas* or *Writing Objectives*) could suggest a number of explanations. First, it could be that for the teachers completing this task, developing course activities is a fundamentally different activity than brainstorming ideas or writing objectives. This conclusion seems plausible in that, conjuring ideas students might have or identifying objectives toward which they might teach could be seen as somewhat more academic. In contrast, teachers may regard actually developing activities as a more concrete task of determining what to do with students on a given day. A second explanation could be that the *Developing Activities* task of the course creation exercise was poorly designed. This third task differed from the first two tasks in that it fixed the number of responses teachers could give. Teachers were instructed to "Describe 3 activities." Consequently, there was much less variability in teachers' scores on this task. So, limited variability in scores coupled with the small sample size might explain the lack of relationship between this task and the first two.

Conclusion

While the findings presented here may be encouraging in a sense, we urge caution and stress the exploratory nature of the present study. The sample used is fairly small; and although we adopted methods of analysis suitable to the sample size, generalizations from this study are premature. Additionally, although the treatment groups were randomly assigned, 2 of the 8 teachers were non-biology majors and both were assigned to the experimental group. Because the Mann-Whitney U test revealed that there was no significant difference between the biology majors and the non-biology majors on any of the three tasks, we are confident that this sampling distribution did not affect the final results. However, the distribution still gives us reason to be cautious.

These findings do, however, point to an instructional methodology that merits further investigation. The idea that providing preservice teachers with some artifact from K-12 students causes them to be mindful of those K-12 students, does not require a conceptual stretch. It is in fact quite intuitive. As such, there is likely a wide range of artifacts that would fill the role of the photo albums used in this study. Examples would be student generated narratives (Cobern, Gibson, & Underwood, 1999), essays, questions, interviews, and artistic representations. Future studies might investigate the impact of various types of artifact exposure and the types of mindfulness that those artifacts encourage. For example, are there student-generated artifacts that encourage teachers to envision more culturally responsive (or gender sensitive) instruction? In light of Simmons et al. (1999) findings that teachers impose their views of themselves as learners on their students, it might be worth asking if there are artifacts that help preservice teachers to develop more realistic views of students as learners.

Additionally, while the course creation exercise proved to be a convenient tool in this project, the ultimate goal of exposing teachers to various artifacts is to impact practice. Hence, it is important to also examine the impact of artifact exposure on practice more directly than is done with the course creation exercise. As well, it would be important to examine the impact of long-term artifact exposure.

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Skills Necessary for Learner Success in an Emporium-designed Mathematics Course

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The author examined the skills and knowledge necessary for learners to succeed in an emporium-designed, asynchronous math course using a qualitative approach. Five learners and 3 faculty members at a large mid-Atlantic university participated in the study, which was conducted in the fall of 2004. Data were obtained from participants via one-on-one interviews and analyzed using constant comparison method. Three factors were identified as necessary for student success in an emporium-designed course: self-regulation, technology skills, and proper prerequisite knowledge. These factors were discussed in the context of self-efficacy theory.

INTRODUCTION

In recent years a new model of course design has emerged which has been labeled the "emporium model" (Twigg, 2003, p. 34). Traditional, synchronous class meetings do not exist for courses using the emporium model. Learners enrolled in an emporium-designed course work on their course assignments asynchronously, for the most part. They choose from a selection of online materials and one-on-one assistance in a computer lab. Some online activities may be accessed from any computer with access to the World Wide Web and some activities are restricted to access only from within a central computer lab. This study was conducted in the context of a college algebra and trigonometry course designed using the emporium model. In that course all course materials and assignments were accessed and completed via the World Wide Web. Learners attended an initial face-to-face orientation meeting with the course facilitator who explained the structure and design of the course. After the orientation meeting, there were no required face-to-face, traditional class meetings. The various assignments in the course had weekly deadlines. Students may study in any location they choose, but computer-based weekly quizzes, tests, and the final exam must all be taken in a specific computer lab. It is conceivable for a learner in such a course to complete the course without initiating a conversation with the course facilitator or another learner in the same course.

The computer lab used by the course in this study houses over 500 computer workstations in one room. The lab is open 24 hours per day, 7 days per week during the academic year. Learners who choose to study at the computer lab can get face-to-face assistance from the math helpers, who are on duty more than 60 hours per week. During this study, the math help staff was comprised of advanced undergraduates, math graduate students, and math faculty members. The course facilitator was available at the Math Emporium several hours each week for individual meetings and one optional 30-minute recitation. The course used in this study was similar to a web-based course in that all of the materials, quizzing, and testing were delivered via computer using the World Wide Web. However, the central computer lab, the staff

of human assistants available, and the optional recitation session provided in the emporium model were resources that are not available in purely web-based courses.

The emporium model has been adopted at several institutions as the redesign option for mathematics courses. The National Center for Academic Transformation (NCAT) lists details on eight, large-scale projects using the emporium-model including efforts at Louisiana State University, the University of North Carolina at Chapel Hill (NCAT, 2005b) and the University of Alabama (NCAT, 2005a). Yet, investigations into the needs of the learners in these environments have not reached publication.

Theoretical Perspective

The social-cognitive construct of *self-efficacy* was used as the theoretical perspective for this study. When students are faced with the task of learning in a new environment they make judgments regarding how successful they will be in that environment. Such judgments are labeled *self-efficacy beliefs*. "Perceived self-efficacy refers to beliefs in one's capabilities to organize and execute the courses of action required to produce given attainments" (Bandura, 1997, p. 3). Self-efficacy has been shown to play an important role in academic performance (e.g., Multon, Brown, & Lent, 1991; Zimmerman & Schunk, 2003). The predominant finding is that learners' self-efficacy beliefs are significantly and positively related to academic performance. The present study was constructed to investigate the research questions: (a) What skills or knowledge do learners need to possesses, or develop, in order to be successful in an emporium-designed course? (b) How can positive self-efficacy beliefs be fostered in students enrolled in an emporium-designed math course?

Answering these questions is a first step in designing interventions to enhance the self-efficacy of students to succeed in these environments. Once the necessary skills and knowledge for success are established, methods to enhance learners' self-efficacy beliefs with regard to those skills and knowledge can be developed. Instructional designers could use this information as new courses and learning environments are developed. Existing courses could have components added or modified to enhance learner self-efficacy.

Developing Self-efficacy Beliefs

Self-efficacy beliefs are created from four principal sources: enactive mastery experiences, vicarious experience, verbal persuasion, and physiological and affective states (Bandura, 1981, 1997). Enactive mastery experiences refer to the confidence building that occurs when learners successfully complete a task similar to the task of interest. Learners develop self-efficacy beliefs through vicarious experiences by observing others perform tasks similar to what they are facing. Verbal persuasion, generally, refers to verbal feedback provided to learners. Physiological and affective states impact self-efficacy beliefs when feelings such as stress, emotion, mood, and pain are involved in the task to be performed.

Persuasory information in the form of evaluative feedback has shown consistent results in experimental research. When learners have been provided with either ability or effort feedback during mathematics practice, self-efficacy and mathematics achievement have increased (Relich, 1984; Schunk, 1981, 1982, 1983, 1984; Schunk & Hanson, 1989). The decision to focus this study on persuasory feedback as the mechanism through which self-efficacy could be enhanced was made after considering the intersection of the prior research results, the four primary sources of self-efficacy development, and the nature of the emporium designed course used in this study. Self-efficacy for technology issues was included due to the technology demands of an emporium-designed course. The interventions envisioned to result from this research are automated feedback systems aimed at increasing individual learners' self-

efficacy beliefs regarding success in emporium-designed courses.

Method

Research Design

A qualitative research design was used in the present study. Given the nature of the research questions addressed in this project, a grounded theory approach was utilized. The aim of this research project was to determine the skills necessary for success in the course and how self-efficacy for those skills might be promoted. One-on-one interviews were the primary data source for this study. "Interviews represent a classic qualitative research method that is directly interactive" (Savenye & Robinson, 2004, p. 1056). The interview data were analyzed using the method outlined by Strauss and Corbin (1998) for grounded theory research. The analysis method is described in more detail later in this report.

Participants

Participants were selected using what Creswell (1998) labels *theoretical sampling* (p. 118). The participants were chosen from a pool of available candidates thought to be able to contribute to the purpose of the study. Five learners (4 females, 1 male) were selected for the present study. The learners varied in academic experience from first year to junior-level students. Their majors included engineering; communications; English; and human foods, nutrition, and exercise. The learners were enrolled in an emporium-designed college algebra and trigonometry course at a large mid-Atlantic state university in the fall of 2004. The learner participants were solicited via e-mail from a list of 784 learners identified by their course facilitator as being successful in the course. The meaning of *successful* was left open to interpretation by the course facilitator. The facilitator considered students successful who had earned a 72% or better average in the course at the time the list of potential participants was constructed. The list was based on learner performance through 3 months of a 4-month semester. Seventeen learners responded to the initial e-mail invitation to participate and 5 were able to schedule interviews and participate in the study.

In addition to the learners, 3 faculty members (all female) were selected to participate in this study. The faculty member participants were facilitating, or had recently facilitated, emporium-designed math courses at the same university the learner participants were attending. All of the faculty participants had multiple years of experience with the type of course involved in this study. None of the participants was compensated or rewarded for participating in this study.

Data Collection, Procedures, and Setting

One-on-one interviewing allowed the researcher to hear the learners' perspectives regarding what they felt made them successful learners. Patton's (2002, p. 344) standardized open-ended interview approach to qualitative interviewing was used in this study. The interview protocols used are listed in the appendix. The interviews were conducted at various locations and times convenient to the interviewees and the interviewer. Interviews with learner participants took place at the computer lab where their course materials were available. Faculty interviews took place in the computer lab and in faculty offices. The researcher took detailed notes during the interviews. Member checks were conducted to enhance the credibility of the data by allowing the participants to review copies of the notes. Participants were then encouraged to review the interview notes and to offer any feedback regarding clarification or corrections. The credibility of the data was enhanced by collecting data from the perspectives of learners and course facilitators.

Data Analysis

The analytical process used in this study was a general data reduction technique following guidelines for grounded theory research from Strauss and Corbin (1998). The analysis process began with a line-by-line interpretation of the interview data. Strauss and Corbin referred to this as *microanalysis*, which they describe as forcing the "researcher[s] to consider the range of plausibility, to avoid taking one stand or stance toward the data" (p. 65). Open coding followed microanalysis. In the open coding process the participants' comments were used to develop "*in vivo codes*" (Glaser & Strauss, 1967). Open coding resulted in the identification of 24 in vivo codes from the participants' comments. Those codes are listed in Table 1.

Initial codes developed during open coding were compared and contrasted during the process of "axial coding" (Corbin & Strauss, 1998, p. 123). In axial coding the initial codes developed during open coding were compared conceptually to develop pattern codes. The six pattern codes established during axial coding are listed in Table 1.

Table 1

Evolution of Codes and Themes from Interview Transcripts

Third Iteration: Themes			
Self-regulation	Technology	Prerequisite math knowledge	
Second Iteration: Pattern Codes Resulting from Axial Coding			
Manage time	Prerequisite math knowledge	Web use	
Work with deadlines		e-mail Computer skills	
First Iteration: Initial Code Analysis Resulting from Open Coding			
Managing time effectively	Prerequisite math knowledge	Web browser use	Mass e-mail is impersonal
Pacing yourself	Algebra skills	Reading e-mail	Math symbols hard in e-mail
Bus schedules	Basic math knowledge	Web surfing	E-mail essential for college
Organizational skills Treat it like a "real"course	Belief that academic success is possible	E-mail, but not for content	Practice
Time management skills Self-discipline		e-mail only if personalized	e-mail too anonymous
Reserve time for class			More personalized attention
Work before deadlines			
Know your deadlines			
Interview Data	Interview Data	Interview Data	Interview Data

Note: "Concept for Table" from Anfara, Brown, & Mangione (2002).

The pattern codes of *manage time* and *work with deadlines* pointed to a core

theme of self-regulation. Self-regulation refers to the degree to which learners are "metacognitively, motivationally, and behaviorally active participants in their own learning process" (Zimmerman, 1989, p. 329). Time management and goal setting are important elements of self-regulation. The more general themes of *technology* and *prerequisite math knowledge* were evident in their own rights, but were subordinate to self-regulation. It was clear from the faculty and learner participants that while those skills were important, without good self-regulation skills, success in the emporium-designed course would be difficult.

The Researcher

Creswell (1998) notes, "the investigator needs to set aside, as much as possible, theoretical ideas or notions so that the analytic, substantive theory can emerge" (p. 58). The researcher for this project was interested in promoting student success through self-efficacy interventions. Based on the researcher's knowledge of the course structure, it was believed that e-mail would play a significant role in the enhancement of learner self-efficacy due to the asynchronous nature of the course. Also, because the course materials are accessed via computer, the researcher believed that technology skills would be important for the learners. These preconceived notions can be observed by examining the interview protocols listed in the appendix. While these beliefs were present in the interview protocols, learners were asked at least one open-ended question. The need for self-regulation skills would not have been discovered without the use of open-ended questioning.

The researcher holds an administrative position in the lab where learners participate in many components of the course. The researcher was not involved with the development of the course used in this study and had no input into the learners' course grades. These facts were stressed with the learners interviewed in an attempt to relax the learners and enable them to provide honest answers and comments during the interview discussions.

Research Limitations

Time was the most significant limitation to this study. The amount of reflection possible by the participants was limited to one interview each. Hence, not all of the characteristics necessary for success may have been exposed. The dual perspective of the learners and the course facilitators was used in an effort to increase dependability of the findings. Also, while attempts were made to ensure the learner participants that the researcher had no impact on grades or involvement with the development of the course materials, the observations of the researcher were most definitely from an etic viewpoint. More prolonged engagement with the participants may have yielded additional information.

Findings

The theme of *self-regulation* emerged as the most consistently noted skill necessary to succeed in an emporium environment. Self-regulation was not addressed specifically in the interview protocols but came out very clearly in the interview conversations. All participants listed some form of self-regulation as a skill necessary for success. Learner participants used wording such as "don't wait to the last minute," "budget your time," or "work before deadlines." Faculty participants' self-regulation statements included, "must check on themselves," "organizational skills," and "time planning." Two other themes, *technology skills* and *prerequisite math knowledge*, were identified during the analysis.

Participants felt that basic computer usage skills and the ability to use the Internet were important factors for success. Faculty and learner participants listed "navigation skills" with regard to browsing on the World Wide Web as skills needed for success in the course. Specific comments related to web browser navigation included

"fundamental browser skills," "scrolling to read an entire page," and "general surfing skills.". Additionally, having prerequisite knowledge for the course was noted as a necessity. Participant remarks leading to the theme of prerequisite math knowledge included "General content skills, comfortable solving equations and working with fractions," and "algebra skills" from faculty members. Learner participants commented that "fundamental algebra skills," or "college entrance math" were necessary.

An unexpected finding was that e-mail was not perceived as a skill necessary for success in the course. Learner participants commented that the e-mail used in the course was impersonal and unnecessary. E-mail was considered unnecessary due to the redundancy of most information provided in e-mails from the course facilitators also being available on the course web pages. Learner participants commented that personalized e-mail messages addressing performance or providing other feedback would be welcome additions to the course. Faculty participants did not consider e-mail use to be essential for learner success. Administrative concerns such as missed quiz deadlines were cited by the faculty participants as the most frequent reason to use e-mail. The faculty participants also noted that the specialized symbols sometimes necessary for math are not easily communicated in e-mail. Neither learners nor faculty mentioned the use of e-mail for learner-to-learner communication.

Discussion

The finding that self-regulation is an important characteristic for success in an emporium-designed course is in agreement with findings for similar learning environments. Self-regulation strategies are well documented in the literature for traditional learning environments (e.g., Zimmerman, 1989). As noted earlier, the emporium-designed course used in this study differs from a purely web-based course. The asynchronous nature of the emporium-designed course used in this study, makes the emerging self-regulation literature for web-based courses relevant to the present discussion. Hodges' (2005) review concluded that self-regulation is an important skill for learners in general and the trend is being established that it is important in web-based courses. Whipp and Chiarelli (2004) identified some self-regulation techniques used by learners in an online course. Kauffman (2004) lists tools and methods that may be useful in encouraging self-regulated learning in web-based environments. In addition, Azevedo, Cromley, and Seibert (2004) and Azevedo and Cromley (2004) have found significant positive effects for self-regulated learning with hypermedia. The findings of the present study, in conjunction with the related research on self-regulation in web-based and hypermedia environments, indicate that emporium-designed courses should be created with self-regulation in mind.

Faculty and learners agreed that confidence with technology was necessary. In this case, technology was viewed as general computer skills and web browsing. Surprisingly, it was believed that e-mail was not a necessary skill for success in the course. E-mail is used sparingly for communication regarding the course and is used typically to address administrative questions about the course, not content. The lack of content discussion in e-mail was attributed by faculty to the lack of standard and simple ways to express the special symbols often necessary for mathematics. This difficulty is noted and elaborated on by Miner (2005). The learners listed the impersonal nature of the faculty's mass e-mail notes and the fact that most information necessary for success is communicated on the associated course web pages as reasons that e-mail is not a necessary skill. The learners expressed that personalized e-mail would be appreciated and that personalized feedback on their performance in the course is desired. Personalized e-mail feedback has been used with modest results by Kauffman (2004) and Jackson (2002) to manipulate

learners' self-efficacy beliefs. The finding in the present study, that students desire this type of feedback, indicates that more research should be conducted to determine how e-mail feedback could be used effectively to assist learners.

Learner and faculty participants commented that being familiar with the necessary pre-requisite content is necessary for success. This is intuitive; especially when one considers that the topic of the course used in the present study was math. There are basic concepts that one must possess to proceed to more advanced mathematics. At the university where this study was conducted there is no institutional route for remediation. Thus, not having the prerequisite skills for this course would definitely impact learner success.

The research questions addressed in this study have been at least partially answered. Skills and knowledge necessary for success in an emporium-designed course were identified. Learners indicated that personalized e-mail message feedback is desirable. Existing research literature demonstrating some success with e-mail feedback supports this desire. The results of the present study may be used to guide survey construction and interventions to address the self-efficacy (Bandura, 1997) beliefs of learners in emporium-designed courses. Self-efficacy has been shown to be an important element of academic achievement in traditional learning environments (e.g., Multon, Brown, & Lent, 1991) and the results of this study demonstrate that self-efficacy may be important in emporium-designed environments as well. Designing emporium-based or other asynchronous courses so that positive self-efficacy beliefs can be fostered may prove beneficial to the learners involved.

The findings presented in this report indicate that future research should be conducted to determine what strategies successful learners use to self-regulate themselves in emporium-designed courses. Additionally, personalized communication with the learners and personalized performance feedback should be investigated for use in emporium-designed courses as a way of enhancing the self-efficacy beliefs of learners regarding the skills identified here.

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Appendix

Questions to Guide Interviews

Questions for Student Participants:

- Do you receive feedback on your math work from your teacher in your math course?
- Do you receive feedback on your math work from the tutors at the Math Emporium?
- Can you recall the specific language used in any feedback you have received?
- Do you think the feedback you receive strengthens your confidence to succeed in your math course?
- Do you use e-mail?
- How would you describe your level of confidence to use e-mail?
- Do you communicate with your math course teacher via e-mail?
- Do you feel that you must communicate with your teacher via e-mail to be successful in your math course?
- How would you describe your level of confidence to communicate mathematics in e-mail?
- How would you describe your level of confidence to browse information on the Internet with a web browser?
- How would you describe your level of confidence to access your math course materials with a web browser?
- What skills, technical or otherwise, do you feel a student has to posses or acquire in order to be successful in your math course?

Questions for Instructor Participants:

- What type of feedback do you provide your students in traditional or asynchronous courses? Please list specific examples.
- Is there a difference in the type of feedback you provide to students in asynchronous courses versus traditional courses? Please elaborate the differences.
- How would you describe your level of confidence to communicate mathematics in e-mail?

- Do you feel that your students must communicate with you via e-mail to be successful in your math course?

- What skills, technical or otherwise, do you feel your students need to master to be successful in your math course?