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AUTHOR Anderman, Eric M.; Midgley, Carol
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ABSTRACT

Recently, psychologists have investigated self-efficacy as it relates to teaching and learning. This study used hierarchical linear modeling (HLM)--a powerful new technique for assessing multilevel data--to examine the effects on self-efficacy of a school-wide effort to value task-mastery and learning over relative ability and competition. The sample included 341 students from 15 classrooms in 2 elementary schools in a predominantly white district. The students responded to a self-report questionnaire, which assessed student motivation, cognitive strategy use, and perceptions of classrooms and schools. Researchers developed measures of self-efficacy, goal orientation (task and performance), and cognitive strategy use (deep and surface strategies) using both original items and items from existing instruments. Results suggest that self-efficacy relates significantly to the following: (1) the belief that intelligence is a changeable entity; (2) the personal adoption of learning-focused goals; and (3) the use of deep cognitive strategies. Students who were encouraged to take academic risks were more self-efficacious than those who were risk averse; however, in the experimental classes, self-efficacy increased regardless of whether or not the teacher encouraged risks, while in the control classes, self-efficacy did not change with the learning focus slope. (RJM)

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STUDENT SELF-EFFICACY AS A FUNCTION OF CLASSROOM GOAL ORIENTATION

Eric M. Anderman & Carol Midgley
The University of Michigan
Combined Program in Education & Psychology
610 E. University
Ann Arbor, MI 48109

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This study uses hierarchical linear modeling (HLM) to examine the effects a school-wide effort to value task-mastery and learning over relative ability and competition on self-efficacy. HLM is used to capture the multilevel nature of our data. Student-level predictors such as deep cognitive strategy use, a belief in the modifiable nature of intelligence, age, and personal adoption of task-focused goals are all related to self-efficacy. Using HLM, we show that students in classrooms where our intervention is used, and where academic risk-taking is encouraged, are more self-efficacious than students in other classrooms.

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INTRODUCTION

Self-efficacy is a powerful force in the regulation of human behavior (Bandura, 1982). Recently, psychologists have become interested in the application of self-efficacy to teaching and learning situations (Schunk, 1985). In the educational domain, self-efficacy refers to

> individuals' beliefs about their performance capabilities in a particular domain. The construct of self-efficacy includes students' judgments about their ability to accomplish certain goals or tasks by their actions in specific situations (Pintrich, 1989).

In the academic domain, students high in self-efficacy feel that they can complete any assignments, learn any material, or master any concepts.

Research in achievement motivation classifies student motivation in terms of one's goals toward learning. Sometimes students are intrinsically motivated, and maintain what are referred to as "task-focused" goals, while at other times students are focused on their relative ability and extrinsic rewards, or how their performance compares with others -- these students maintain what are referred to as "performance goals" (Maehr & Pintrich, 1991; Nicholls, 1989; Dweck & Leggett, 1988).

These "goals" can be adopted by individual students (Dweck et al., 1988), by entire classrooms (Ames & Archer, 1988), or by the school as a whole (Maehr, 1991; Maehr, Midgley & Urdan, in press). The present paper presents the first year's results of a three year longitudinal study of the effects on student self-efficacy of a school-wide movement away from performance goals and more toward task-focused goals.

Our "intervention" consisted of weekly meetings between university and school "teams." The university group consisted of faculty and graduate students, and the school group consisted of an administrator and teachers. At these weekly meetings, the two teams

discussed ways in which the school as a whole could move away from a stress on ability and performance, and more toward an emphasis on learning and task-mastery (Maehr & Buck, in press; Maehr. Midgley and Urdan, in press).

Method

Subjects

The sample includes 341 third through fifth grade students from 15 classrooms in two elementary schools in the same district. The district is predominantly white; 11% of the students are African-American. Ninety percent of the children in the two schools were given permission to participate.

Measures

The students responded to a self-report questionnaire consisting of 108 items assessing student motivation, cognitive strategy use, and perceptions of their classrooms and schools. A subset of these items was used in the present study. Questionnaires were administered to students in their classrooms in October 1990 and May 1991. Measures of self-efficacy, goal orientation (task and performance) and cognitive strategy use (deep and surface strategies) were developed using items from existing instruments as well as original items. All measures were piloted. Teachers completed a survey assessing their personal beliefs and classroom practices. All items were on a five point Likert scale.

Results

Gender and pre-treatment differences were examined in preliminary analyses on all of the cognitive and motivational variables, and only one measure, the use of deep strategies, showed a statistically significant difference. Although significant at the .05 probability level, the difference is small and thus analyses for this study were undertaken with the sample as a whole. An analysis of covariance showed no significant pre-treatment differences in self-efficacy between the intervention and control schools. Table 1 presents

correlations for the May data.[1] Multiple regressions on the May data suggested that self-efficacy is significantly related to a belief that intelligence is a "modifiable" or changeable entity, to a personal adoption of learning-focused goals, and to the use of deep cognitive strategies. These results support the findings of previous studies (Nicholls, 1989; Nolen, 1988).

An Application of Hierarchical Linear Modeling to the Problem

Hierarchical linear modeling (HLM) is a powerful new technique for assessing multilevel data (Bryk, Raudenbush, Seltzer & Congdon, 1989) . This technique is well-suited to our data, since we are examining the effects of *classroom-level* practices on *student-level* outcomes. HLM provides a more accurate representation of such effects than merely assigning classroom-level characteristics to individual students (Bryk et. al, 1989).

A one way ANOVA with random effects confirmed that 15% of the variance in self-efficacy occurs across classrooms (chi square=63.6, p<.000). First, a "student-level" model was developed to examine the effects of student-level characteristics on self-efficacy. The same predictors that were used in the multiple regressions were used in the HLM; however, grade level was added to examine the effects of age on self-efficacy.The residual variance for all predictors except "learning focus" was set to zero, since these measures do not (and should not) vary by classroom. Table 2 presents the results of this analysis. Deep strategy use, a belief in the modifiable nature of intelligence, and being learning focused all positively predict self-efficacy, while student grade-level negatively predicts self-efficacy.[2] The full level-one model is presented below:

Self Efficacy= ßoj + ß1j (Deep Strategies) + ß2j (Modifiability) + ß3j (Learning Focus) - ß4j(Grade) +rij

[1]All May data were standardized using z-scores.
[2]Reliabilities are 0.312 (Base) and 0.366 (Learning Focus Slope).

Since the intercept (chi square=975.60, p<.001) and learning-focus slope (chi square=27.6, p<.05) still significantly vary by classroom, a second model was developed to examine the effects of classroom-level variables on self-efficacy and the learning focus slope. Table 3 presents the results of this analysis. The nearly significant gamma (p=.056) for "teacher encourages risk-taking" shows that students have higher self-efficacy in classrooms where the teachers encourage students to take academic-risks. The significant gamma for the effect of our intervention[3] on the learning-focus slope (γ=0.403, p<.01) shows that being learning-focused increases self-efficacy for students in the experimental classrooms. However, the "encourages academic risks" variable is negatively related to the slope (γ=-0.223, p<.05). The full level-two model is presented below:

$$\beta_{0j} = \gamma_{00} + \gamma_{01}\,(\text{Encourages Academic Risks}) + u_{0j}$$

$$\beta_{1j} = \gamma_{10} + \gamma_{01}\,(\text{Experimental/Control}) - \gamma_{02}\,(\text{Encourages Academic Risks}) + u_{ij}$$

Figure 1 presents the relationship between these variables. In all classrooms, students who are encouraged to take academic risks are more self-efficacious than those who are not; however, in the experimental classes, self-efficacy increases *regardless of whether or not the teacher encourages risks*, while in the control classes, self-efficacy does not change with the learning focus slope. After inclusion of these classroom level variables in the model, the learning-focus slope no longer varies across classrooms (chi square=20.06, p=.13). While self-efficacy does still significantly vary across classrooms, 73% of the between-classroom variance has been accounted for.

[3]This was a dummy variable, with the intervention classrooms coded with the higher value. Reliabilities for the level 2 model are 0.539 (base) and 0.220 (learning focus slope).

Discussion

The present results only represent the initial findings of our work. However, it is encouraging that after one year, the adoption of school-wide task-focused goals are related to positive psychological outcomes in students. The use of HLM for these analyses provides a more direct picture of the relationships between classroom-level factors and student-level outcomes than standard ordinary least squares regression.

While the reported observations are encouraging on an empirical level, we are also encouraged by the qualitative changes that have occurred in our intervention school. For example, in less than one year, the school has adopted multi-age heterogeneously grouped classes, has re-designed the system which recognizes student achievement, and has redesigned school-wide programming to reflect a "task" rather than a "performance" focus.

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Table 1: Zero-Order Correlations on May Data

	Self-Efficacy	Deep Strategies	Modifiability	Learn-Focus
Self-Efficacy	1.00	.396	.212	.488
Deep Strategies	.396	1.00	.156	.601
Modifiability	.212	.156	1.00	.232
Learning-Focus	.488	.601	.232	1.00

Table 2: Significance of Student-Level Effects on Self-Efficacy

Variable	Gamma	Standard Error	T	p-value
For Base Coefficient				
Base	**1.453**	**0.302**	**4.819**	**0.000**
For Deep Strategy Use Slope				
Base*	**0.164**	**0.060**	**2.732**	**0.017**
For Modifiability Slope				
Base*	**0.112**	**0.050**	**2.241**	**0.040**
For Learning Focused Slope				
Base	**0.285**	**0.676**	**3.760**	**0.003**
For Grade Slope				
Base*	**-0.360**	**0.074**	**-4.880**	**0.000**

* = fixed (residual parameter variance=0)

Table 3: Significance of Student and Classroom Level Effects on Self-Efficacy

Variable	Gamma	S. Error	T	p-Value
For Base Coeff.				
Base	**1.486**	**0.361**	**4.113**	**0.002**
Teacher encourages risk-taking	**0.210**	**0.103**	**2.053**	**0.056**
For Deep Strategies				
*Slope Base	**0.139**	**0.059**	**2.366**	**0.034**
For Modifiability				
*Slope Base	**0.111**	**0.049**	**2.278**	**0.039**
For Learning Focus				
Slope Base	**-0.227**	**0.198**	**-1.142**	**0.197**
Control/Experimental	**0.403**	**0.137**	**2.941**	**0.014**
Teacher encourages students to take academic risks	**-0.223**	**0.107**	**-2.090**	**0.053**
For Grade				
*Slope Base	**-0.383**	**0.089**	**-4.287**	**0.002**

Figure 1: Relationship between self-efficacy and learning focus slope for experimental and control classrooms in which risk Taking is highly or not highly encouraged by teachers