School Contextual Factors and Student Outcomes: A Validation Study

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Abstract

This paper presents the results of a validation study to determine the reliability and validity of psychometric instruments developed for middle schools to measure the quality of interdisciplinary team interactions, school contextual factors, and student self-reported outcomes. The sample for the study is derived from a large-scale sample of middle-grades schools (fifth through eighth grade) from four states. Data were collected from over 6,000 middle-grades teachers and over 100,000 middle-grades students using quantitative self-study survey measures. This large and diverse sample includes 235 middle-grade schools in Arkansas, Louisiana, Michigan, and Mississippi, collected during the 2002-03 school year. Exploratory and confirmatory factor analyses and reliability analyses were conducted on a sub-group (1,493 teachers, 51,542 students, 96 schools) of the overall sample to examine the psychometric properties of three constructs, including quality of interdisciplinary team interactions, school contextual factors (i.e., team decision making, teacher decision making, classroom climate, work climate, teacher efficacy), and student self-reported outcomes (i.e., belonging, climate, academic efficacy, self-esteem, and delinquency). Lower-order and higher-order factors were identified for both the teacher and the student constructs. The results demonstrate the validity of the measures used in this study and provide a foundation for subsequent exploration and research.

Over the years, the education of middle-grades students has often focused on the structural elements of schools, including the grade configuration (i.e., K-8, 7-8, 6-8), the name of the school (i.e., elementary, junior high, middle school), and the debate of whether young adolescents should be grouped as long as possible with younger students or be transitioned to settings that also include older students. However, leaders in middle-grades education agree that the name of the school and the grade configuration of the school do not predict whether that school is effective in educating young adolescents. Rather, it is the implementation of the middle-grades concept that brings about the necessary reform of middle-grade schools to better meet the educational and developmental needs of young adolescents. The middle-grades concept can be defined as a vision for middle-grades education that guides the educational experiences of young adolescents and typically incorporates practices such as interdisciplinary teaming, advisory programs, exploratories, integrated curriculum, hands-on learning, and cooperative learning. Position papers from national organizations and other scholarly publications recommend these key components to ensure the academic, social, and emotional success of students attending middle-grade schools (Jackson & Davis, 2000; National Forum to Accelerate Middle Grades Reform, n.d.; National Middle School Association, 2003).

Central to the middle-grades concept is the implementation of interdisciplinary teaming, typically defined as a group of teachers from different subject areas who plan and work together and who share the same students for a significant portion of the school day. Teams generally focus on creating coordinated lesson plans; sharing and discussing student progress, problems, and issues; and integrating subjects around a central theme or issue (Erb, 2001; Epstein & Mac Iver, 1990; George & Alexander, 2003; Pate, 1997). Research has demonstrated that in order for interdisciplinary teams to be effective, they not only need regular common planning time to work

together as a group (Erb & Doda, 1989; Flowers, Mertens, & Mulhall, 1999; George & Alexander, 2003; Howe & Bell, 1998; Warren & Muth, 1995), they also need to establish and nurture their team as a collaborative work group so that they collectively embrace the team approach (Erb, 2001; George & Alexander, 2003; Pate, 1997; White, 1997).

Also important to the middle-grades concept is the notion that in order to be effective learning communities, middle-grades schools must operate within a culture that is democratic, supportive, collaborative, and empowering. These characteristics of the educational environment impact the social and intellectual climate of the school, and thus successful outcomes for students (George & Alexander, 2003; Jackson & Davis, 2000; Davis, 2001).

Finally, since the goal of the middle-school concept is to better meet the needs of young adolescents, we must consider the types of student outcomes that we are seeking. Clearly, academic achievement outcomes are important. However, most educators agree that other factors, such as students' sense of belonging, their feelings of academic efficacy, and their experiences in a positive climate are also quite valuable, and are likely to be related to their academic success. A review of the research on the middle-school concept and its effects on student academic and social-emotional outcomes are promising and report measurable gains in student adjustment and achievement among students attending schools that have implemented to middle-school concept (Lee & Smith, 1993; Felner, Jackson, Kasak, Mulhall, Brand, Flowers, 1997; Mertens, Flowers, & Mulhall, 1998; Backes, Ralston, & Ingwalson, 1990).

This paper will present the results of a validation study to determine the reliability and validity of psychometric constructs developed for middle schools to measure the quality of interdisciplinary team interactions, school contextual factors, and student self-reported outcomes. This validation study examines one part of a larger structural equation model designed to

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measure the impact and effect of various components (i.e., structures and organization, school

contextual factors, teaching practices, and student outcomes, including experiences, socio-

emotional, and achievement) of middle-school restructuring (Bishop, Mertens, Flowers, Hesson-

McInnis, 2007; Hesson-McInnis, Bishop, Mertens, Flowers, 2007; Mertens, Flowers, Hesson-

McInnis, Bishop, 2007) . A validation study for middle-grades teaching practices within the

larger model was previously presented (Mertens, Flowers, Hesson-McInnis, & Bishop, 2006).

The results of this paper will demonstrate the validity of the measures used in this study and

provide a foundation for subsequent exploration and research of this model for school

improvement.

Objectives

The development and validation of instruments designed to measure the quality of

interdisciplinary team interactions and school contextual factors in middle-grade schools are

important to understanding how they are influenced by teaming structures and organizations, as

well as how they predict team practices and classroom instructional practices, and student

outcomes. The development and validation of instruments designed to measure student

outcomes are critical to understanding how the various factors of the middle-school concept (i.e.,

teaming structures and organizations, school contextual factors, quality of team interactions,

team and classroom practices) predict student success. The specific objectives of this study were

the following:

- To describe the development of a set of measures designed to assess the quality of

    interdisciplinary team interactions, school contextual factors, and student self-reported

    outcomes

- To assess the psychometric properties of the instruments

- To evaluate whether a higher-order structure is present and appropriate for assessing the quality of interdisciplinary team interactions, school contextual factors, and student self-reported outcomes.

Methods

Data Sources

The data for this study were collected using the School Improvement Self-Study, a set of quantitative survey measures for middle-grades teachers, students, administrators, and parents. In 2003, more than 6,200 teachers in 235 middle-grade schools in Arkansas, Louisiana, Michigan, and Mississippi participated in the Self-Study. These schools are located in diverse geographic areas (i.e., urban, rural, suburban), contain students in grades five through eight, and have an average of 55 percent of the student population receiving free or reduced-price lunch. With such a large sample, we decided to split the data into two sub-samples by randomly assigning schools to either a development group (50%) or a testing group (50%) for analysis purposes. This methodology allows us to cross-validate our findings from the development sample with the data in the testing sample. We will not, however, report cross-validation results in this paper due to the need to restrict the use of the testing sample as part of the broader structural equation model.

Using the development sub-sample of over 3,000 teachers and 50,000 students in 113 schools, it was necessary to consider other factors that influence the quality of team interactions, school contextual factors, and student outcomes. In addition to traditional middle-grade configurations (i.e., 5-8, 6-8, 7-8), the schools in our overall four-state sample have several

different types of elementary and high school grade configurations including K-8, K-12, 7-12. In prior analyses, we have observed that school policies and functioning sometimes vary from elementary to middle to high school; therefore, it was necessary to select only schools with middle-grade configurations (e.g., 5-8, 6-8, 7-8). We have also observed that teacher reports of the levels of middle-grades practices vary depending on type of class—core, academic (e.g., language arts, mathematics, science, social studies) or non-core (e.g., art, music, technology). By selecting only core, academic teachers in middle-grade schools, our sub-sample for this analysis was 1,493 teachers, 51,542 students in 96 schools.

Measures

In 1990-91, the Center for Prevention Research and Development (CPRD) at the University of Illinois, Urbana-Champaign, developed a School Improvement Self-Study process for middle-grade schools. The Self-Study consisted of quantitative survey measures for teachers, students, and principals. The constructs and indicators were based on the recommendations of the Carnegie Corporation's seminal work, *Turning Points: Preparing American Youth for the 21st Century* (Carnegie Council on Adolescent Development, 1989). *Turning Points* contained a set of recommendations to improve middle-grade schools, particularly schools containing large percentages of at-risk students. These recommendations included creating small, safe, personalized learning communities, teacher advocates for every student, relevant curriculum and appropriate instructional strategies, teachers prepared to teach this age group, and family and community involvement. Utilizing these recommendations and the extant research literature on middle schools and young adolescent developmental needs, CPRD developed the Self-Study as a

set of quantitative measures to assist schools in measuring the level of implementation of the *Turning Points* recommendations.

This study will focus on the measurement of teacher reports of quality of interdisciplinary team interactions and school contextual factors as well as student self-reports of outcomes. The Self-Study teacher survey measures the quality of interdisciplinary team interactions with a series of items identified by practitioners and researchers as effective strategies for working together in a team setting to improve student success. Quality of interdisciplinary team interactions is a 19-item construct that is designed to assess how effectively interdisciplinary team members work together in a cohesive and supportive manner, their readiness for teaming, and how effectively they set expectations for students and address student needs. Teachers responding to the quality of interdisciplinary team interactions items answer using a five-point metric ranging from strongly disagree (1) to strongly agree (5).

The quality of interdisciplinary team interactions questions are designed to be answered by middle-grades teachers that are engaged in interdisciplinary teaming in their school. Interdisciplinary teaming is broadly defined as a group of teachers that coordinate the teaching of core subject areas (e.g., English, mathematics, science, social studies) within the same group of students over the course of the school year. Teachers engaged in teaming typically have common planning periods, in addition to their individual planning periods, to facilitate the coordination of team practices and activities. Teaming enables middle-grade schools with large student populations to create smaller, more personalized learning communities.

The middle school contextual factors are assessed on the Self-Study through several constructs, including team decision making, teacher decision making, teacher efficacy, work climate, and classroom climate. The two decision making constructs are designed to assess

decision making at the team level and at the individual teacher level. The 14-item team decision making construct assesses how much decision-making authority the interdisciplinary team has regarding instruction, assessment, and activities. Teaming teachers respond to the team decision making questions using a five-point frequency metric ranging from very little (1) to very much (5). On the other hand, the 6-item teacher decision making construct asks teachers about whether they feel they participate in decisions made at their school and whether they have autonomy to make decision in their own classrooms. The teacher decision making measure uses a five-point metric from strongly disagree (1) to strongly agree (5).

The teacher efficacy construct (4 items) asks about teachers' feelings about their ability to work with all students to find teaching methods that will be effective for each individual. Teachers respond to the teacher efficacy questions using a five-point metric ranging from strongly disagree (1) to strongly agree (5). The work climate construct (8 items) is intended to assess teachers' commitment to the school via hard work, positive attitude, and group spirit, as well as teachers' feelings that they are recognized for their contributions and supported by the administration. Teachers respond to the work climate questions using a five-point frequency metric ranging from never (1) to always (5).

Classroom climate is measured with 18 items and is designed to assess teachers' views about their classroom environment. It includes such concepts as whether students respect each other and are sensitive to diverse cultures, are academically motivated, and work together constructively. It also asks about whether students initiate positive interactions with their teacher. Finally, classroom climate further includes teachers' feelings of whether students are disruptive, inattentive, and restless in class. For the classroom climate construct, teachers respond using a five-point metric ranging from strongly disagree (1) to strongly agree (5).

Student self-reported outcomes are measured with multiple constructs including school climate, sense of belonging, academic efficacy, self-esteem, and delinquency. School climate (19 items) queries students about whether teachers are encouraging and supportive, expectations of classroom behavior and performance are clearly defined and upheld by teachers, and whether teachers place priority on engaging students in the learning process. School climate further asks whether students interact negatively toward each other and whether discipline is harsh. The student school climate construct uses a five-point frequency metric ranging from never (1) to always (5).

Another outcome that is important to measure among students is their sense or feelings of belonging at their school. For young adolescents, it is important that they feel connected to their school and that they are accepted in the school community by both teachers and their fellow students. The 7-item belonging scale, therefore, asks students about whether they are accepted by others at school, whether they can be themselves at school, and whether they are included in activities at school. As with the school climate construct, students also answer the belonging measure on a five-point frequency metric ranging from never (1) to always (5).

Academic efficacy is also an outcome measured by the Self-Study. It is designed to assess students' attitudes toward their schoolwork in terms of whether they are willing to work hard in order to be academically successful. The five-item academic efficacy scale uses a four-point metric ranging from strongly disagree (1) to strongly agree (4). Self-esteem, another outcome measured, is answered using the same four-point agree-disagree metric as academic efficacy. The self-esteem construct (8 items) delves into whether students have positive feelings about themselves in general (e.g., I like being just the way I am, I am happy with myself as a person, I feel good about how well I get along with other kids).

Delinquency is the final student outcome measured by the Self-Study. Delinquency (8 items) is designed to assess the level of problem behaviors that a student is exhibiting. Thus, it asks questions such as how often the student has engaged in negative behaviors like breaking rules at school, getting into fights with other students, and acting mean toward others. The delinquency construct is answered on a frequency metric including never (1), once or twice (2), three to six times (3), seven to twelve times (4) and more than 12 times (5).

Data Analysis

This study is part of a broader structural equation model for middle-school restructuring that asserts that multiple educational reform factors (e.g., teaming structure, quality of team interactions, school contextual factors, team practices, classroom practices), in combination with each other, impact student success (i.e., socio-emotional development, student achievement) in a positive and lasting manner (Bishop, Mertens, Flowers, Hesson-McInnis, 2007; Hesson-McInnis, Bishop, Mertens, Flowers, 2007; Mertens, Flowers, Hesson-McInnis, & Bishop, 2006, 2007) . The large-scale nature of the data collected for the broader project, of which this study is a small piece, allowed us to bifurcate the data, randomly assigning cases either to a model development sub-sample or to a model testing sub-sample using a stratified approach to ensure that data from each grade, school, and state are represented in both sub-samples. By splitting the original data, we can utilize the model development sub-sample to investigate, modify, and refine hypothesized models (or even generate new models), with no limitations to model modification, because the model testing sample provides the opportunity to examine the cross-validation of these models in a separate, uncontaminated sample. To be most useful in cross-validation, however, we have restricted our use of the model testing sample; thus, we do not report cross-

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validation evidence at this juncture. We plan to cross-validate this study in the model-testing sample as part of our work on the broader structural equation model.

The initial method of data analysis used for this paper is exploratory factor analysis (EFA) to identify potential factors. Next, the internal consistency in the form of reliability was evaluated using Cronbach's α. The primary data analysis, however, used confirmatory factor analysis (CFA) and higher-order CFA to investigate the factor structure of items measuring the quality of interdisciplinary team interactions, school contextual factors, and student self-reported outcomes. We only considered CFA models that we were confident were identified models; thus, each model had at least three indicators per factor, each item had a factor complexity of one, and measurement error terms were not correlated (Bollen, 1989).

<div align="center">Results</div>

<div align="center">*Exploratory Factor Analysis*</div>

Quality of interdisciplinary team interactions

We began our psychometric analysis with exploratory factor analysis (EFA) of the 19 quality of interdisciplinary team interaction items. Two factors with eigenvalues >1 were extracted using principal axis factoring and rotated using direct oblimin rotation with Kaiser normalization to allow for correlated factors. These two factors accounted for 69.4 percent of the variance. Examination of the pattern matrix (Table 1) suggested that the first factor represented interdisciplinary team interactions related to how effectively teachers set expectations for students and address student needs (10 items, $\alpha = .952$). The second factor represented how well interdisciplinary team teachers work together in a cohesive and supportive manner as well as their readiness for teaming (9 items, $\alpha = .940$).

School contextual factors

Although there are multiple measures within the school contextual factors, including team decision making, teacher decision making, teacher efficacy, work climate, and classroom climate, the larger structural equation model representing our theoretical base depicts school contextual factors as encompassing all these constructs. We further theorize that school contextual factors is one of the components of middle-school restructuring, which when combined with teaming structures and team and classroom practices, will positively impact student outcomes. Therefore, our EFA included all 50 items from the five constructs included in school contextual factors (i.e., team decision making, teacher decision making, teacher efficacy, work climate, and classroom climate). The initial EFA used principal axis factoring, oblimin rotation, and allowed free factors. The scree plot suggested that there were eleven factors. In examining the eleven factors, we found that many of the factor groupings were not conceptually sound. We therefore theorized that six factors was a more acceptable solution. To be certain that a six-factor solution was ideal, we ran additional EFA forcing a six-factor solution, and found that the statistics supported it. In the six-factor solution, 54.8 percent of the variance is explained. Examination of the pattern matrix (Table 2) suggested the following six factors:

- Factor 1 - team decision making (14 items, $\alpha = .930$)

- Factor 2 - teacher decision making (6 items, $\alpha = .846$)

- Factor 3 – positive classroom climate (8 items, $\alpha = .890$)

- Factor 4 – disruptive classroom climate (5 items, $\alpha = .862$)

- Factor 5 – work climate (8 items, $\alpha = .885$)

- Factor 6 – teacher efficacy (9 items, $\alpha = .633$)

Student self-reported outcomes

Student self-reported outcomes, like school contextual factors, are also measured with multiple instruments. In an effort to understand their interactions with each other, the EFA was conducted with all 47 items measuring student self-reported outcomes including school climate, belonging, academic efficacy, self-esteem, and delinquency. Using principal axis factoring and oblimin rotation, the suggested solution indicated by the scree plot and eigenvalues was a seven factor solution. However, an examination of the factors from a conceptual viewpoint led us to force a six factor solution which also resulted in positive statistics. The six factors account for 51.2 percent of the variance (Table 3). The six factors for student outcomes include:

- Factor 1 – positive school climate (12 items, α = .875)

- Factor 2 – delinquency (8 items, α = .872)

- Factor 3 – self-esteem (7 items, α = .897)

- Factor 4 – negative school climate (7 items, α = .719)

- Factor 5 – academic efficacy (6 items, α = .874)

- Factor 6 – belonging (7 items, α = .796)

Confirmatory Factor Analysis

Quality of interdisciplinary team interactions and school contextual factors combined

The constructs of quality of interdisciplinary team interactions and school contextual factors are conceptually related and highly correlated, so we began confirmatory factor analysis (CFA) by fitting an eight factor model, as suggested by the EFA above, with factor correlation constraints for quality of interdisciplinary team interactions. This model demonstrated fairly

poor fit: NNFI = .95; CFI = .96; RMSEA = .06; standardized RMR = .12; and χ^2(2,261,

N=1,134) = 10,306. Our second CFA model, also run with eight factors, eliminated the factor

correlation constraints of the first model. The fit statistics, however, were not improved. We

next ran CFA using a single, higher-order factor to account for the substantial correlations

among the eight lower-order factors, and this model demonstrated better fit: NNFI = .95; CFI =

.95; RMSEA = .07; standardized RMR = .09; and χ^2(2,269, N=1,134) = 10,926. Since the model

containing the higher order factor seemed most appealing, we next decided to combine the two

quality of interdisciplinary team interactions factors into a single factor and rerun the CFA model

using a single, higher order factor and seven lower-order factors. This model attempted to

ascertain the necessity of two lower-order factors to represent quality of interdisciplinary team

interactions; however, the results did not show a better fit. We next eliminated quality of

interdisciplinary team interactions from the CFA analyses and ran a single higher-order factor

and six lower order factors (representing only the school contextual factors). The fit statistics

were not improved by removing quality of interdisciplinary team interactions. Our final CFA

model, which we adopted as it demonstrated the best fit statistics, was run using two higher-

order factors to account for the correlations among the eight lower-order factors. The fit of this

final and more parsimonious model were: NNFI = .95; CFI = .96; RMSEA = .06; standardized

RMR = .07; and χ^2(2,268, N=1,134) = 10,501. The lower-order standardized loadings, standard

error estimates, and R^2 for each indicator are presented in the separate factors columns of Table

4. The standardized loadings of lower-order factors on the higher-order factor, along with the

standard error estimates and R^2 values, are in the separate factors columns of Table 4.

Student self-reported outcomes

As suggested by the EFA analysis, the student outcome constructs are highly related and correlated. The CFA analysis went very smoothly as we quickly found a model with excellent fit statistics. Our final model used a single, higher-order factor to account for the substantial correlations among the six lower-order factors. In this model, the 47 student outcome items load on one of the six lower-order factors, which in turn load on the higher-order student outcomes factor. This model demonstrated excellent fit: NNFI = .96; CFI = .96; RMSEA = .05; standardized RMR = .06; and χ^2(1,028, N=32,125) = 83,128. The lower-order standardized loadings, standard error estimates, and R^2 for each indicator are presented in the combined factors columns of Table 5. The standardized loadings of lower-order factors on the higher-order factor, along with the standard error estimates and R^2 values are also in the combined factors columns of Table 5.

Discussion

The importance of this study is that it establishes reliable and valid psychometric measures of teachers' reports of quality of interdisciplinary team interactions and school contextual factors, as well as students' self-reported outcomes, three key components of middle-grades restructuring. Not only did we confirm that the School Improvement Self-Study measures these components reliably, but we also established the factor validity of these measures. This study, therefore, paves the way for more sophisticated models of middle-grades restructuring that examine relationships between two or more components of the middle school concept, rather than the examination of a single component.

Limitations

Our approach to reliability utilized the consistency among a set of items thought to measure the same construct rather than examining the consistency of measures over time. Similarly, our approach to validity centered on confirming the factor structure of our measures and did not include criterion-based validity. Ironically, it is the impressive sample size (generally one of the stronger assets of the study) that made these alternatives impractical.

Future Research

The study examining the validity and reliability of measures of quality of interdisciplinary team interactions, school contextual factors, and student self-reported outcomes is one of several steps in examining the interactions of multiple components of middle-grades restructuring. It provides empirical research to support the validity of these measures and enables continued development and testing of a structural equation model of middle-grades school improvement and restructuring. Not only are we planning on using the measurement structure we developed and validated in this paper as important constructs in a comprehensive model for the middle grades approach, but we also look forward to cross-validating our findings in the model-testing sample we reserved for future analyses.

References

Backes, J., Ralston, A., & Ingwalson, G. (1999). Middle level reform: The impact on student achievement. *Research in Middle Level Education Quarterly, 22*(3), 43-57.

Bishop, C., Mertens, S. B., Flowers, N., & Hesson-McInnis, M. (2007). *Methodological factors in addressing middle grades teaming structures and organizations.* Paper presented at the annual meeting of the American Educational Research Association, Chicago, IL.

Bollen, K. A. (1989). *Structural equations with latent variables*. New York: John Wiley & Sons.

Carnegie Council on Adolescent Development. (1989). *Turning points: Preparing American youth for the 21st century*. The report of the Task Force on Education of Young Adolescents. New York: Carnegie Corporation of New York.

Davis, G. A. (2001). Transformation and context in middle grades reform. In T. S. Dickinson (Ed.), *Reinventing the middle school* (pp. 249-268). New York: RoutledgeFalmer.

Epstein, J. L., & Mac Iver, D. J. (1990). *Education in the middle grades: National practices and trends*. Columbus, OH: National Middle School Association.

Erb, T. O. (2001). Transforming organizational structures for young adolescents and adult learning. In T. S. Dickinson (Ed.), *Reinventing the middle school* (pp. 176-200). New York: RoutledgeFalmer.

Erb, T. O., & Doda, N. M. (1989). *Team Organization: Promise–Practices and Possibilities.* Washington, DC: National Education Association.

Felner, R. D., Jackson, A. W., Kasak, D., Mulhall, P., Brand, S., & Flowers, N. (1997). The impact of school reform for the middle years: Longitudinal study of a network engaged in

Turning Points-based comprehensive school transformation. *Phi Delta Kappan, 78*(7), 528-532, 541-550.

Flowers, N., Mertens, S. B., & Mulhall, P. F. (1999). The impact of teaming: five research-based outcomes of teaming. *Middle School Journal 31*(2), 57-60.

George, P. S., & Alexander, W. M. (2003). *The exemplary middle school* (3rd ed.). Belmont, CA: Thomson/Wadsworth Learning.

Hesson-McInnis, M., Bishop, C. Mertens, S. B., & Flowers, N. (2007). *Results from a cross-sectional structural equation model assessing the impact of middle grades structures, organizations, and practices on student outcomes.* Paper presented at the annual meeting of the American Educational Research Association, Chicago, IL.

Howe, A. C., & Bell, J. (1998). Factors associated with successful implementation of interdisciplinary curriculum units. *Research in Middle Level Education Quarterly, 21*(2), 39-52.

Jackson, A. W., & Davis, G. A. (2000). *Turning points 2000: Educating adolescents in the 21st century.* New York: Teachers College Press.

Lee, V., & Smith, J. (1993). Effects of school restructuring on the achievement and engagement of middle-grades students. *Sociology of Education, 66*(3), 164-187.

Mertens, S. B., Flowers, N., Hesson-McInnis, M., & Bishop, C. (2006). *Middle-grades teaching practices: A validation study.* Paper presented at the annual meeting of the American Educational Research Association, San Francisco, CA.

Mertens, S. B., Flowers, N., Hesson-McInnis, M., & Bishop, C. (2007). *Development of a multivariate/multi-level model examining the impact of middle grades structures,*

organizations, and practices on student outcomes. Paper presented at the annual meeting

    of the American Educational Research Association, Chicago, IL.

Mertens, S. B., Flowers, N., & Mulhall, P. (1998). *The Middle Start Initiative, phase 1: A*

    longitudinal analysis of Michigan middle-level schools. (A report to the W. K. Kellogg

    Foundation). Urbana, IL: University of Illinois.

National Forum to Accelerate Middle Grades Reform. (n.d.). *Our vision statement*. Retrieved

    June 15, 2004, from http://www.mgforum.org/about/vision.asp

National Middle School Association. (2003). *This we believe: Successful schools for young*

    adolescents. Westerville, OH: Author.

Pate, E. (1997). Teaming and decision making. In T. S. Dickinson & T. O. Erb (Eds.), *We gain*

    more than we give: Teaming in middle schools (pp. 425-442). Columbus, OH: National

    Middle School Association.

Warren, L. L., & Muth, K. D. (1995). The impact of common planning time on middle grade

    students and teachers. *Research in Middle Level Education, 18*(3), 41-58.

White, G. P. (1997). Team maturity: Learning to grow together, an ethnography of two middle

    level teams. In T. S. Dickinson & T. O. Erb (Eds.), *We gain more than we give: Teaming*

    in middle schools (pp. 63-92). Columbus, OH: National Middle School Association.

Table 1

Exploratory Factor Analysis: Pattern Matrix of Quality of Interdisciplinary Team Interactions

Item		Factor loadings[1]	
		1	2
qtl39	Effectively act as coaches/facilitators to promote active involvement of students in learning activities	.91	
qtl41	Communicate our high expectations for achievement to students	.90	
qtl23	Work to motivate students	.84	
qtl26	Work to make learning developmentally appropriate or child-centered	.81	
qtl28	Get to know students as individuals	.81	
qtl24	Recognize and solve individual student problems	.80	
qtl25	Maintain a positive relationship with students' parents	.78	
qtl42	Recognize or reward students for meeting achievement expectations	.77	
qtl31	Hold equally high expectations for student achievement regardless of a student's background	.75	
qtl30	Have high expectations for student achievement	.73	
qtl13	Work well together as a unit		.92
qtl14	Respect each others' opinions and ideas		.90
qtl16	Have an open line of communication with the team/department leader		.87
qtl09	Have effective leadership		.82
qtl40	Understand their roles and responsibilities		.82
qtl15	Share professional material and information with each other		.81
qtl06	Are sufficiently trained in teaming/working in groups		.69
qtl10	Endorse the effectiveness of the educational practices they are being asked to implement		.68
qtl17	Maintain contact with other teachers in their area of content specialization		.66
Factor correlations			
Factor 1		—	.74
Factor 2		.74	—

1 Factor loadings below .20 in absolute value have been suppressed from the table.

Table 2

Exploratory Factor Analysis: Pattern Matrix of School Contextual Factors

Item		Factor loadings[1]					
		1	2	3	4	5	6
tm09	Evaluation of student programs	.82					
tm17	Designing/determining assessment methods	.81					
tm16	Establishment of learner outcomes	.78					
tm11	Team activities	.76					
tm08	Team goals	.75					
tm14	Setting student evaluation and assessment standards	.74					
tm12	Team resources	.73					
tm13	Kind and amount of homework that students receive	.72					
tm02	Instructional methods and materials	.72					
tm01	How curricular goals are to be reached with regard to use of time and procedures	.72					
tm05	Allocation of instructional time	.66					
tm07	Use of common planning time	.62					
tm03	Student discipline/behavioral management	.61					
tm04	School-wide goals	.52					
cc22	Recognize each others' individual strengths		-.70				
cc23	Respect viewpoints different from their own		-.69				
cc20	Like to be challenged academically		-.66				
cc21	Respect cultures different from their own		-.65				
cc12	Are motivated		-.64				
cc09	Care about what they do		-.64				
cc04	Are concerned about achievement		-.59				
cc24	Enjoy working together		-.51				
sc09	Staff take pride in the school			.80			
sc08	There is a group spirit among the staff			.79			
sc10	It is easy to get staff to do extra work			.77			
sc05	Staff push themselves to do their best work			.70			
sc11	The building administration recognizes staff who have done something well			.56		-.27	
sc12	The building administration really stands up for staff			.55		-.36	
sc13	Staff members are encouraged to make constructive suggestions			.54		-.40	
sc14	Building administrators give full credit to ideas contributed by the staff			.48		-.38	
cc06	Are restless				.69		
cc07	Call out answers, out of turn				.69		
cc02	Disrupt what others are doing				.68		
cc15	Bicker or quarrel with each other				.68		

Item		**Factor loadings**[1]					
		1	**2**	**3**	**4**	**5**	**6**
cc16	Are inattentive				.65		
dm05	I am encouraged to make my own decisions					-.78	
dm02	I have a great deal of freedom to do as I like					-.73	
dm07	I am allowed to use my own initiative to do things					-.73	-.20
dm01	The building administration is open to my input about decisions that affect me					-.65	
dm06	I help decide how school policies should be changed					-.56	
dm09	I take part in decisions about adopting new programs at this school					-.53	
eff03	By trying a different teaching method, I can significantly affect a student's achievement						-.52
eff02	If some students in my class are not doing well, I feel I should change my approach to the subject						-.50
cc01	Share their concerns with me						-.46
cc10	Express their feelings		-.28				-.42
eff01	If I try hard I can get through to even the most difficult or unmotivated student						-.38
cc14	Talk about their homes and their families		-.29				-.37
cc08	Ask for comfort or support when needed		-.32				-.37
cc03	Join class discussions		-.23				-.37
eff04	There is little I can do to insure that most of my students achieve at a high level						.22

Factor correlations

	1	2	3	4	5	6
Factor 1	—	-.17	.27	-.13	-.38	-.20
Factor 2	-.17	—	-.29	.30	.15	.32
Factor 3	.27	-.29	—	-.04	-.29	-.09
Factor 4	-.13	.30	-.04	—	.05	.07
Factor 5	-.38	.15	-.29	.04	—	.10
Factor 6	-.20	.32	-.09	.07	.10	—

1 Factor loadings below .20 in absolute value have been suppressed from the table.

Table 3

Exploratory Factor Analysis: Pattern Matrix of Student Self-Reported Outcomes

Item		Factor loadings[1]					
		1	2	3	4	5	6
ses34	Students are given clear instruction about how to do their work in classes	.65					
ses114	Teachers want students to understand their school work, not just memorize it	.64					
ses117	Teachers recognize students for improvement and effort	.64					
ses18	Teachers go out of their way to help students	.62					
ses48	Teachers help students to organize their work	.62					
ses49	Teachers help students catch up when they return from an absence	.61					
ses116	Teachers really expect students to work hard in school	.59					
ses40	If some students are acting up in class, the teachers will do something about it	.59					
ses38	If students want to talk about something, teachers will find time to do it	.59					
ses28	When teachers make a rule, they mean it	.56					
ses39	Students understand what will happen to them if they break a rule	.49					
ses113	Teachers stress that understanding the work is more important than just getting the right answers	.46					
del6	Hitting other people		.74				
del2	Breaking rules at school		.73				
del5	Telling lies or cheating		.71				
del3	Getting into fights with other kids		.69				
del8	Stealing things from stores or other people		.66				
del1	Acting mean toward others		.65				
del9	Cutting classes or skipping school		.64				
del4	Hanging around with kids who get in trouble		.62				
seq20	I am the kind of person I want to be			-.82			
seq29	I like being just the way I am			-.80			
seq3	I am happy with the way I look			-.76			
seq15	I am happy with myself as a person			-.74			
seq31	I am as good a person as I want to be			-.69			
seq16	I am as well liked by other kids as I want to be			-.53			.31
seq21	I feel good about how well I get along with other kids			-.51			.24
ses47	It is easy for a student to get kicked out of class in this school				.55		
ses51	The rules in this school are too strict				.53		
ses14	Teachers are very strict here				.51		
ses24	Students in this school have trouble getting along with				.50		-.24

Item		Factor loadings[1]					
		1	2	3	4	5	6
	each other						
ses7	Students in this school are mean to each other				.49		-.22
ses16	There are kids in this school who pick on other kids				.47		
ses41	Students get in trouble for breaking small rules				.47		
seq45	I am certain I can figure out how to do even the most difficult class work					-.76	
seq42	I can do even the hardest work in my classes if I try					-.75	
seq44	Even if the work in class is hard, I can learn it					-.72	
seq41	I am certain I can master the skills taught in school this year					-.66	
seq40	I can do almost all the work in my classes if I don't give up					-.59	
seq5	I am happy with the way I can do most things			-.36		-.38	
ses121	People at this school are friendly to me						.61
ses126	Other students here like me the way I am						.59
ses120	I feel like a real part of school	.20					.44
ses124	I can really be myself at this school	.21					.40
ses123	I am treated with as much respect as other students	.27					.38
ses122	I am included in lots of activities at this school						.36
ses125	I feel proud of belonging to this school	.34					.36

	Factor correlations					
Factor 1	—	-.35	-.27	-.08	-.38	.38
Factor 2	-.35	—	.22	.25	.24	-.23
Factor 3	-.27	.22	—	-.00	.50	-.42
Factor 4	-.08	.25	-.00	—	.07	-.16
Factor 5	-.38	.24	.50	.07	—	-.21
Factor 6	.38	.23	-.42	-.16	-.21	—

1 Factor loadings below .20 in absolute value have been suppressed from the table.

Table 4.

Quality of Team Interactions and School Contextual Factors: Standardized Factor Loadings, Standard Error Estimates, and Squared Multiple Correlations for Lower-Order Factors

Factor / Items	Standardized Loading (λ)	Estimated Standard Error	R^2
QUALITY OF TEAM INTERACTIONS (19 items)			
Student Needs and High Expectations[1] (α =.952)	**.953**	**.037**	**.909**
qtl39 Effectively act as coaches/facilitators to promote active involvement of students in learning activities	.862	N/A[2]	.743
qtl41 Communicate our high expectations for achievement to students	.875	.015	.766
qtl23 Work to motivate students	.861	.015	.742
qtl26 Work to make learning developmentally appropriate or child-centered	.832	.017	.693
qtl28 Get to know students as individuals	.782	.016	.612
qtl24 Recognize and solve individual student problems	.817	.015	.668
qtl25 Maintain a positive relationship with students' parents	.823	.016	.677
qtl42 Recognize or reward students for meeting achievement Expectations	.769	.017	.592
qtl31 Hold equally high expectations for student achievement regardless of student's background	.767	.020	.589
qtl30 Have high expectations for student achievement	.782	.017	.612
Team Cohesion and Readiness for Teaming[1] (α =.940)	**.811**	**.035**	**.657**
qtl13 Work well together as a unit	.870	N/A[2]	.757
qtl14 Respect each others' opinions and ideas	.860	.018	.740
qtl16 Have an open line of communication with the team/department leader	.846	.018	.716
qtl09 Have effective leadership	.873	.018	.763
qtl40 Understand their roles and responsibilities	.839	.017	.703
qtl15 Share professional material and information with each other	.787	.019	.620
qtl06 Are sufficiently trained in teaming/working in groups	.685	.027	.469
qtl10 Endorse the effectiveness of the educational practices they are being asked to implement	.757	.022	.573
qtl17 Maintain contact with other teachers in their area of content specialization	.715	.021	.511
SCHOOL CONTEXTUAL FACTORS (50 items)			
Team Decision Making[1] (α =.930)	**.621**	**.036**	**.386**
tm09 Evaluation of student programs	.778	N/A[2]	.605
tm17 Designing/determining assessment methods	.729	.029	.531
tm16 Establishment of learner outcomes	.749	.029	.561
tm11 Team activities	.733	.028	.538
tm08 Team goals	.721	.029	.521

Factor / Items		Standardized Loading (λ)	Estimated Standard Error	R^2
tm14	Setting student evaluation and assessment standards	.714	.030	.509
tm12	Team resources	.726	.029	.527
tm13	Kind and amount of homework that students receive	.639	.029	.408
tm02	Instructional methods and materials	.722	.027	.521
tm01	How curricular goals are to be reached with regard to use of time and procedures	.709	.030	.502
tm05	Allocation of instructional time	.657	.034	.432
tm07	Use of common planning time	.580	.036	.336
tm03	Student discipline/behavioral management	.641	.028	.411
tm04	School-wide goals	.603	.028	.364
Teacher Decision Making[1] (α =.846)		**.570**	**.036**	**.324**
dm05	I am encouraged to make my own decisions	.856	N/A[2]	.732
dm02	I have a great deal of freedom to do as I like	.821	.021	.673
dm07	I am allowed to use my own initiative to do things	.818	.018	.669
dm01	The building administration is open to my input about decisions that affect me	.595	.027	.354
dm06	I help decide how school policies should be changed	.546	.029	.298
dm09	I take part in decisions about adopting new programs at this school	.540	.028	.292
Positive Classroom Climate[1] (α =.890)		**.509**	**.038**	**.259**
cc22	Recognize each others' individual strengths	.712	N/A[2]	.508
cc23	Respect viewpoints different from their own	.689	.029	.475
cc20	Like to be challenged academically	.727	032	.529
cc21	Respect cultures different from their own	.630	.030	.397
cc12	Are motivated	.802	.030	.644
cc09	Care about what they do	.786	.027	.617
cc04	Are concerned about achievement	.722	.027	.521
cc24	Enjoy working together	.590	.023	.349
Disruptive Classroom Climate[1] (α =.862)		**-.330**	**.038**	**.109**
cc06	Are restless	.760	N/A[2]	.578
cc07	Call out answers, out of turn	.758	.029	.575
cc02	Disrupt what others are doing	.759	.033	.577
cc15	Bicker or quarrel with each other	.713	.031	.508
cc16	Are inattentive	.757	.029	.574
Work Climate (α =.885)		**.643**	**.041**	**.413**
sc09	Staff take pride in the school	.646	N/A[2]	.417
sc08	There is a group spirit among the staff	.642	.031	.413
sc10	It is easy to get staff to do extra work	.613	.031	.375

Factor / Items		Standardized Loading (λ)	Estimated Standard Error	R²
sc05	Staff push themselves to do their best work	.529	.023	.280
sc11	The building administration recognizes staff who have done something well	.782	.035	.611
sc12	The building administration really stands up for staff	.807	.034	.651
sc13	Staff members are encouraged to make constructive suggestions	.805	.034	.647
sc14	Building administrators give full credit to ideas contributed by the staff	.770	.033	.593
Teacher Efficacy[1] (α =.633)		**.584**	**.048**	**.341**
eff03	By trying a different teaching method, I can significantly affect a student's achievement	.524	N/A[2]	.275
eff02	If some students in my class are not doing well, I feel I should change my approach to the subject	.444	.030	.197
cc01	Share their concerns with me	.629	.028	.395
cc10	Express their feelings	.570	.026	.325
eff01	If I try hard I can get through to even the most difficult or unmotivated student	.508	.041	.258
cc14	Talk about their homes and their families	.539	.033	.291
cc08	Ask for comfort or support when needed	.550	.034	.303
cc03	Join class discussions	.490	.023	.240
eff04	There is little I can do to insure that most of my students achieve at a high level	-.291	.030	.085

1   These entries represent the loadings of lower-order factors on the higher-order factor. All other loadings represent loadings of items on lower-order factors.

2   The standard error estimates are not computed for items used as reference indicators to establish the scales of latent variables.

Table 5.

Student Outcomes: Standardized Factor Loadings, Standard Error Estimates, and Squared Multiple Correlations for Lower-Order Factors

Factor / Items		Standardized Loading (λ)	Estimated Standard Error	R^2
STUDENT OUTCOMES: EXPERIENCES & SOCIO-EMOTIONAL (47 items)				
Student Belonging[1] (α =.796)		**.861**	**.009**	**.742**
ses126	Other students here like me the way I am	.623	N/A[2]	.388
ses121	People at this school are friendly to me	.575	.007	.330
ses124	I can really be myself at this school	.637	.009	.405
ses120	I feel like a real part of school	.665	.009	.442
ses123	I am treated with as much respect as other students	.627	.008	.393
ses125	I feel proud of belonging to this school	.680	.009	.463
ses122	I am included in lots of activities at this school	.462	.009	.214
Positive School Climate[1] (α =.875)		**.705**	**.007**	**.497**
ses34	Students are given clear instruction about how to do their work in classes	.663	N/A[2]	.440
ses114	Teachers want students to understand their school work, not just memorize it	.646	.007	.418
ses117	Teachers recognize students for improvement and effort	.688	.007	.474
ses18	Teachers go out of their way to help students	.624	.007	.389
ses116	Teachers really expect students to work hard in school	.620	.006	.384
ses49	Teachers help students catch up when they return from an absence	.625	.008	.390
ses48	Teachers help students to organize their work	.634	.008	.402
ses38	If students want to talk about something, teachers will find time to do it	.626	.008	.392
ses40	If some students are acting up in class, the teachers will do something about it	.611	.006	.374
ses28	When teachers make a rule, they mean it	.548	.007	.300
ses39	Students understand what will happen to them if they break a rule	.553	.007	.305
ses113	Teachers stress that understanding the work is more important than just getting the right answers	.460	.008	.211
Negative School Climate[1] (α =.719)		**-.336**	**.008**	**.113**
ses47	It is easy for a student to get kicked out of class in this school	.399	N/A[2]	.159
ses51	The rules in this school are too strict	.416	.011	.173
ses14	Teachers are very strict here	.436	.010	.190
ses41	Students get in trouble for breaking small rules	.255	.008	.065
ses24	Students in this school have trouble getting along with each other	.696	.012	.485
ses7	Students in this school are mean to each other	.703	.012	.494
ses16	There are kids in this school who pick on other kids	.646	.012	.418

Factor / Items		Standardized Loading (λ)	Estimated Standard Error	R^2
Academic Efficacy[1] (α =.874)		**.685**	**.007**	**.470**
seq45	I am certain I can figure out how to do even the most difficult class work	.793	N/A[2]	.628
seq42	I can do even the hardest work in my classes if I try	.786	.004	.618
seq44	Even if the work in class is hard, I can learn it	.808	.004	.654
seq41	I am certain I can master the skills taught in school this year	.739	.004	.546
seq40	I can do almost all the work in my classes if I don't give up	.694	.004	.482
seq5	I am happy with the way I can do most things	.626	.004	.392
Self-esteem[1] (α =.897)		**.676**	**.006**	**.457**
seq20	I am the kind of person I want to be	.815	N/A[2]	.665
seq29	I like being just the way I am	.785	.004	.617
seq3	I am happy with the way I look	.739	.004	.547
seq15	I am happy with myself as a person	.784	.004	.614
seq31	I am as good a person as I want to be	.735	.004	.541
seq16	I am as well liked by other kids as I want to be	.685	.004	.469
seq21	I feel good about how well I get along with other kids	.698	.004	.487
Delinquency[1] (α =.872)		**-.465**	**.007**	**.216**
del2	Breaking rules at school	.760	N/A[2]	.577
del6	Hitting other people	.740	.007	.548
del5	Telling lies or cheating	.719	.007	.517
del3	Getting into fights with other kids	.680	.005	.463
del1	Acting mean toward others	.673	.007	.454
del4	Hanging around with kids who get in trouble	.674	.008	.455
del8	Stealing things from stores or other people	.626	.004	.392
del9	Cutting classes or skipping school	.608	.004	.370

1   These entries represent the loadings of lower-order factors on the higher-order factor. All other loadings represent loadings of items on lower-order factors.

2   The standard error estimates are not computed for items used as reference indicators to establish the scales of latent variables.