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A Review of the Quantitative Research on Multigrade Instruction

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ABSTRACT

This paper examines the quantitative research literature regarding the effects multigrade classroom organization has on student cognitive and affective outcomes. Findings indicate that student achievement is neither better nor worse in multigrade classrooms. However, areas relating to student affect significantly favor the multigrade environments. But quantitative studies only reveal one dimension of multigrade instruction. Research is needed that provides a rich, detailed description of multigrade classroom life in, especially high performing classrooms.

INTRODUCTION

The multigrade classroom has traditionally been an important and necessary organizational pattern of education in the United States. In 1918, there were 196,037 one-room schools, representing 70.8 percent of all public schools in the United States. By 1980, less than 1,000 of these schools remained (Muse, Smith & Barker, 1987). The number of multigrade classrooms consisting of two grades or more is considerably higher. For example, in a study of multigrade classrooms of only two grades, Rule (1983) used a sample from a suburban district outside of Phoenix, Arizona. Of the 21,000 elementary students in the district, approximately 17 percent were in combined classrooms. Many school districts combine classrooms as a cost-cutting measure. Thus, the multigrade classroom still holds a significant place in schools, especially in small isolated rural districts.

The multigrade classroom has also had a significant place in mainstream urban and suburban districts. In the 1960s and 1970s, the ungraded school, open education, and individualized instruction became driving forces in school organization. Energized by developmental theories of learning, a large influx of federal money and student-centered models of instruction, the multigrade classroom became a major educational innovation.

This resulted in numerous studies conducted to assess the effectiveness of multigrade classroom instruction. Interestingly, when educators described these changes in school organization, they often used the image of the one-room school with its multiage "family" groups, student-centered learning and cooperative atmosphere. For the most part, efforts to recapture the ideal of the one-room school were unsuccessful. Only a small proportion of the multigraded "experiments" of the 1960s and 1970s remain.

We have learned a great deal from these innovative efforts. Working in an open, multigrade school requires serious, ongoing teacher training and a commitment to hard work. Most teachers receive training for teaching single grade classrooms

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organized around whole-class and/or small ability-grouped instruction. When placed in an open, multigrade setting, teachers discover that the time requirements and skills needed to be effective are simply not part of their training and experience.

In addition, a long tradition of graded schools has created powerful expectations for administrators, teachers and parents regarding how schools should be organized. Graded instructional organization is a norm expected of schools which creates a handicap for anyone (whether out of necessity or by theoretical design) seeking to operate a multigrade school. Although the large scale innovations of the '60s and '70s have virtually ended, the multigrade classroom remains a powerful reality for many small, rural school districts in the United States, as well as for many schools throughout the world.

For most rural educators, multigrade instruction is not an experiment or a new educational trend, but a forceful reality based on economic and geographic necessity. In a society where educational environments are dominated by graded organization, the decision to combine grades is often quite difficult.

Within this context, many teachers, administrators and parents continue to wonder whether multigrade organization has negative effects on student performance. Therefore, an overriding question in the minds of many educators and parents faced with the reality of multigrade classroom organization is, "What effect does multigrade instruction have on student performance?" The purpose of this research is to answer that question.

Research studies focusing on multigrade instruction, especially in rural settings, are quite rare. Through contacts with rural educators both in the United States and abroad, and through computer searches of ERIC, Psychological Abstracts and the Social Science Citation Index, a body of research literature was collected. Only quantitative studies were reviewed. In other words, only studies designed to determine whether there were statistically significant differences between elements or variables in a school or classroom were selected. The research was then organized and reviewed according to cognitive and affective outcomes. However, it should be kept in mind that no distinction has been drawn between studies of rural and metropolitan multigrade classrooms. This was due to the fact that so few empirical rural studies could be located. In addition, the underlying purpose of this research review was to describe how multigrade students perform in relation to their single-grade counterparts.

QUANTITATIVE STUDIES: STUDENT ACHIEVEMENT

Table 1 provides an overview of quantitative studies that were designed to ascertain the differences in student achievement between students enrolled in single and multigrade classrooms. Nearly half of these studies were conducted during the '60s and '70s when there was a large interest in team teaching, individualized instruction and multigrade instructional grouping. These studies are unique in that the programs were driven by a theoretical design rather than economic necessity.

In many cases this would suggest a difference in attitude and belief by those working in these settings. The remainder of the studies focus primarily on combined classroom situations. Research literature on the rural one or two-room school is quite limited, primarily consisting of descriptive, survey and self report/opinion types of information.

The studies summarized in Table 1 indicate that there is little or no difference in achievement in students in single or multigrade classrooms. Two studies (Knight, 1938; Chace, 1961) found that multigrade students performed consistently higher in mathematics, reading and language than did single-grade students. However, the differences were not statistically significant. In eight studies (Drier, 1949; Adams, 1953; Way, 1969; Harvey, 1974; Adair, 1978; MacDonald & Wurster, 1974; Lincoln, 1981; Pratt & Treacy, 1986) researchers found no difference between student performance in the multigrade or single-grade classrooms. Only in the studies that reported mixed results do we find significant differences.

Yerry (1964) investigated the differences between students combined in grades 1-2, 3-4, and 5-6 with students from single-grade classes. Differences between levels within the multiage group were also compared. At grades 2, 3 and 6, there were no significant differences from single-grade students. But at grades 1 and 5, significant differences favoring multigrade classes were found for some subjects (arithmetic, language, and total achievement for both grade 1 and grade 5). Milburn (1981) found significant differences for vocabulary that favored the multigrade students, but when analyzed by age, it was found that lower-level multigrade students performed better than their single-grade counterparts. At the upper levels there was little or no difference.

Table 1
Research on Multigrade Classroom Instruction: Student Achievement

Study	Unit of Measurement	Comparison Groups: Multigrade N	Multigrade Level	Multigrade (Organization)	Single Grade N	Single Grade Level(s)	Measure	Subjects	Results
Knight (1938)	Classroom (no. of students not specified)	7 7	4th 4th	(3-4 combined) (4-5 combined)	6 6	4th 4th	Achieve. test Achieve. test	Reading, Math, Language, Spelling	T T
Drier (1949)	Students	923	6th	(1-6 mixed)	599	6th	Achieve. test	Reading, Math, Language, Spelling	N
Adams (1953)	Students	150	5th	(4-5 combined)	150	5th	Achieve. test	Reading, Math, Language	N
Chace (1961)	Classroom (No. of students not specified)	3	3 to 6	(mixed)	57	3 to 6	Achieve. test	Reading, Math, Language	T
Yerry (1964)	Students	500	1 to 6	(1-2) (3-4) (5-6)	500	1 to 6	Achieve. test	Reading, Math, Language	M+
Way (1969)	Students	135	1 to 5	(combined)	671	1 to 5	Achieve. test	Reading, Math, Language	N
Harvey (1974)	Students	31	K	(K-1 combined)	152	K	Achieve. test	Readiness Achievement	N
MacDonald and Wurster (1974)	Students	Not Specified	2nd	(1-3 mixed)	Not Specified	2nd	GATES Reading test	Reading	N
Adair (1978)	Students	500*	1st	(K-1 combined)	500*	1st	Achieve. test	Reading, Math, Listening, Word Analysis	N

Study	Unit of Measurement	Comparison Groups: Multigrade N	Multigrade Level(s)	Multigrade (Organization)	Single Grade N	Single Grade Level(s)	Measure	Subjects	Results
Milburn (1981)	Students	125	1 to 6	(4 classes w/ 3 yr. span per class)	125	Not Specified	Achieve. test	Reading, Math	M+
Lincoln (1981)	Students	402	2nd	(combined)	402	2nd	Achieve. test Aptitude	Reading	N
Rule (1983)	Students	3,360*		(2-3)	3,360*	2 to 6	Achieve. test	Reading, Math	M+
Pratt & Treacy (1986)	Classroom	13 2	1 to 2 2 to 3	(combined) (combined)	13 10	1st 2nd	Observation & document analysis	Students Learning	N

\+ = Statistically significant T = Trend favoring multigrade, but not significant M = Mixed results N = No difference
*N includes total sample

Rule (1983) compared student achievement for 3, 360 students in grades 3, 4, 5 and 6 across three settings:

- •students who came from multigrade classrooms of two grades (for example fourth and fifth or third and fourth)
- •single-grade classrooms in schools with multi grade classrooms
- •single-grade classrooms in schools with only singe-grade classes

In addition, students were grouped and compared according to high, medium to high and average achievement. Only reading and mathematics performance were analyzed.

Results were mixed. For reading, only one analysis produced significant differences between single and multigrade classrooms. High performing fourth grade students from multigrade classrooms had significantly better scores than high performing students from single fourth grade classrooms.

In general, multigrade students scored higher in reading on standardized achievement tests than did single-grade students. However, for math achievement, the results are nearly reversed.

High-achieving third graders in single-grade classes scored significantly higher than their multigrade counterparts. Of the 12 analyses conducted, four favored multigrade classes and eight favored single-grade classes. Rule (1983) concludes her study with several implications for the practitioner contemplating combined classrooms:

1. Multigrade classes do not appear to affect reading achievement negatively; rather, they may actually enhance it for average to high-achieving students.
2. Student mathematics achievement might be negatively affected by placement in a multigrade classroom, especially for grade 3.
3. If one is contemplating combining classes, the average/high-achieving students appeared to be the best configuration for all grades in reading and for grades 4, 5, and 6 for math.

Rule's (1983) research does not yield information regarding low-achieving students or mixed-ability group students since nearly all students placed in the multigrade classrooms were selected because of their high achievement. In other words, when school officials combined classes they tended to select the higher achieving students for placement as a means of reducing the achievement disparity in the multiage classroom. It was believed this would simplify the work demands on the teacher. In addition, Rule did not include first or second grades as part of her sample.

The most comprehensive study of multigrade classrooms reviewed was conducted by Pratt and Treacy (1986) in Australia. Their study sought to identify differences between single and multigrade primary classrooms in rural and urban settings. Teacher interviews, structured classroom observations, analysis of student work and a student attitude measure were used for data collection. Unlike the research previously reviewed, Pratt and Treacy placed a heavy emphasis on the classroom context, thus providing an excellent picture of student and teacher behavior across a range of single and multigrade classrooms at the primary level.

Pratt and Treacy (1986) found that there was no indication that academic progress or social development were affected by how students were grouped (i.e., multigrade vs. single grade). Their review of student academic work indicates students from both types of classrooms were progressing at nearly the same rate. Interestingly, larger differences were found within classroom types than between them. In other words, when they observed how individual classrooms were organized, regardless of whether they were single or multigrade, they observed a great deal of variation in student at-task behavior. More research of this type is sorely needed to provide practitioners with detailed information on what actually occurs in the classroom.

QUANTITATIVE STUDIES: STUDENT ATTITUDES

Where the multigrade classroom has the greatest impact on student performance is in the affective domain (Pratt, 1986; Ford, 1977). Results generally favor the multigrade classroom when measures of student attitude toward self, school or peers are compared across a range of schools and geographic areas. Table 2 provides an overview of key studies on multi-

Table 2
Research on Multigrade Classroom Instruction: Student Attitude

Study	Unit of Measurement	Comparison Groups: Multigrade N	Multigrade Level	Multigrade (Organization)	Single Grade N	Single Grade Level(s)	Measure	Topics	Results
Chace (1961)	Classroom (No. of students not specified)	3	3 to 8	(mixed)	57	3 to 6	-California Test of Personality	Personality & Social Development	+
Yerry & Henderson (1964)	Students	600	1 to 6	(1-3, 4-6)	600	1 to 6	-Ohio Social Accept. Scale	Friendship	N
							-Test Anxiety Scale	School Anxiety	N
Mycock (1966)	Students	150-180		(K-3)	150-180	(K-3)	-Test Anxiety Scale	School Anxiety & Social Adjustment	N
							-Sentence Completion	Teacher-Child Relations	+
							- Drawing Test		
							- Student Observation	Range of Social Interaction	+
							-Aspiration	Levels of Aspiration	+
Junell (1970)	Students	54	(Not specified)		96	(Not specified	-Bill's Index of Adjustment & Values	Self Concept Self Acceptance Ideal Self	T
							-Borg's USU School Inventory	Attitude Toward School	+
							-California Test of Personality	Belonging	
								Freedom from Withdrawal	N
								Freedom from Antisocial Tendencies	
Schroeder & Nott (1974)	Students	140	(1 to 5)	(Not specified)	140	(1 to 5)	-Bonnie Myer's Attitude Toward School	Attitude Toward School	+
Papay, Costello, Hedl, Spielberger (1975)	Students	133	1 to 2	(Mixed)	133	(1 to 2)	-State-Trait Anxiety Inventory	Trait Anxiety	+
								State Anxiety	+
Schrankler (1976)	Students	990	K - 6	(Mixed & K-1, 2-3, 4-6)	Not specified		-IOX Measures of Self Concept & Attitude Toward School	Self Concept	+
								Attitude Toward School	+
							-Parent Approval Index	Perception of Approval	+
							How About You? What Would Your do?	Perception of School Success Expectations of Success	+
							-School Sentiment	Dimensions of School	+
Milburn (1981)	Students	125		(4 classes w/ 3 yr. span)	125	(K - 6)	-Piers-Harris Self-Concept Scale	Self Concept	T
							-NFER Attitude Survey	School Attitudes	T
Sherman (1984)	Students	87	3 to 5	(Mixed)	87	3 to 5	-Sociogram	Social Distance	+
Pratt & Treacy (1986)	Classroom	13	1 to 2	(Combined)	13	1st	-How You Feel About School Inventory	Attitude Toward School	N
		2	2 to 3	(Combined)	10	2nd			

+ = Statistically significant T = Trend favoring multigrade, but not significant M = Mixed results N = No difference
*N includes total sample

grade instruction, with only the affective measures displayed. Of the nine studies reviewed there were approximately 23 separate measures of student attitude. Sixty-five percent of the measures favored the multigrade classroom at a significant level, 13 percent indicated a trend toward multigrade students out-performing their single-grade counterparts, and 22 percent revealed no differences between classroom types. Only one measure favored the single-grade classroom.

How do multigrade students feel about school and themselves, and do they feel different about their fellow students than do single-grade students? Five different measures of attitude toward school were used. Four of the five studies (Schroeder & Nott, 1974; Schrankler, 1976; Milburn, 1981; Junell, 1970; Pratt & Treacy, 1986) favored the multigrade students (three at the significant level) and one indicated no difference. Clearly, multigrade students have more positive attitudes toward school.

When measures of attitude toward self were administered the results were nearly the same. Schrankler (1976) found multigrade students to have significantly higher self-concept scores than students in single grades. Milburn (1981) and Junell (1970), using different measures of self-concept, found that multigrade students out-performed single-grade students, but not at a statistically significant level.

When assessing student social relationships and sense of belonging, the overall trend favors the multigrade students. Sherman (1984) discovered that multigrade students felt closer to their multiage classmates than did single-grade students. Chace (1961) and Mycock (1966) found that multigrade students had significantly better teacher-child relationships and better social development than single-grade students. Yerry and Henderson (1964) and Junell (1970) found no differences between single and multigrade students in terms of friendships and belonging.

In terms of anxiety toward school, multigrade students fared slightly better than single-grade students. Papay, Costello, and Spielberger (1975) used the State-Trait Anxiety Inventory to measure student anxiety levels. Multigrade students had significantly less anxiety than single-grade students. However, in studies conducted by Yerry and Henderson (1964) and Mycock (1966), no differences were found.

The most significant differences between single and multigrade classrooms were found in measures of self-concept and related measures of self-perception. Most studies favored the multigrade setting. Three studies indicate that multigrade students have better self-concepts than single-grade students (Junell, 1970; Schrankler, 1976; & Milburn, 1981).

One interesting finding emerged from the Schrankler (1976) study. When 10-year-olds were asked about their expectations for success, the results indicated that single-grade students had significantly higher expectations than multigrade students. However, when 11-year-olds were asked to describe their perceptions of how successful they were in school, the results favored the multiage classroom. These seemingly contradictory results provide an excellent illustration of the problems researchers face in assessing student attitudes.

Variation in grades, time of year, quality of instruction and socio-economic status, to mention only a few key variables, mediate student perceptions. Educational researchers studying student attitudes often have difficulty setting up studies where these variables can be adequately controlled. One compensation strategy is the aggregation of studies across setting and time. Practitioners can have greater confidence when many studies indicate similar results.

Viewed as a whole, the ten studies presented (Table 2) clearly indicate that students in multigrade classrooms tend to have significantly more positive attitudes towards themselves and school. A trend toward more positive social relationships was also indicated.

CONCLUSION

Twenty-one quantitative studies comparing the effects of multigrade with single-grade classroom organization were reviewed. Table 1 provided an overview of 13 experimental studies assessing student academic performance, while Table 2 presented 10 studies that focused on student attitudes. Clearly, these studies indicate that being a student in a multigrade classroom does not negatively affect academic performance nor student social relationships and attitudes. In terms of academic achievement, the data clearly support the multigrade classroom as a viable and equally effective organizational alternative to single-grade instruction. Some research evidence does suggest there may be significant differences depending on subject and/or grade level. Primarily, these studies reflect the complex and variable nature of school life. However, there are not enough of these studies to make safe generalizations regarding which

subjects or grade levels are best for multigrade instruction.

When it comes to student affect, the case for multigrade organization appears much stronger, with multigrade students out-performing single-grade students in over 75 percent of the measures used. One wonders, then, why we do not have more schools organized into multigrade classrooms.

One response to this question is that "We have nearly always organized classrooms by grade levels—that history and convention dictate graded classrooms." This response seems a bit ironic, given the early dominance of the multigrade school in American education. However, there is a related but more compelling answer that can be found in the classrooms themselves and in information drawn from classroom practitioners.

The quantitative studies reviewed focused on numerical student outcome data (i.e. test scores). Detailed contextual information describing what actually occurs in the classroom was not collected in these studies. We do not learn how teachers plan, prepare and teach with multiple grades. As a result, we do not know how teachers feel and respond to being assigned to a combined classroom. How are students grouped? Are classroom management and organization different? Are there different strategies for teaching specific subjects? These are just a few of the important questions that must be understood in light of the multigrade environment in order to understand why multigrade classrooms are not more prominent. To respond to these questions will require qualitative methodology, one preferably linked to student outcomes through quantitative measures. Clearly, we need more rural research that links qualitative and quantitative methods — studies that describe the rich context of rural classroom instruction along with related cognitive and affective outcomes.

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