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ABSTRACT

The Wisconsin Program for the Renewal and Improvement of Secondary Education (WRISE) was designed in order to enable staffs of local junior and senior high schools to improve student achievement in English, mathematics, and reading. Toward this purpose, a series of filmstrips, audiocassettes, a textbook, and various learning guides were developed for both school staffs and university students preparing for secondary school teaching or administration careers. This report outlines the purposes and activities of WRISE, describes its implementation in five Wisconsin schools, discusses the research strategy developed for ongoing evaluation of the program's effects on achievement, and provides achievement data for participating students. Information from a wider survey (involving ten schools) of teachers' and staff members' perceptions of the WRISE program is also presented. Finally, evaluation findings of university classes and instructors using WRISE materials and concepts are briefly reviewed. (GC)

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USABILITY AND EFFECTIVENESS OF THE WISCONSIN PROGRAM FOR THE RENEWAL AND IMPROVEMENT OF SECONDARY EDUCATION: A SUMMARY OF THE EMPIRICAL EVIDENCE

by

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Overview of WRISE

WRISE consists of a design for the improvement of secondary education and accompanying materials that explain the design and how to employ it. The program has four main elements. First, there is a design which consists of 10 comprehensive objectives and related enabling objectives that indicate desirable directions for secondary education and illustrative means for attaining the comprehensive objectives. Second, there is a six-step improvement process that is to be adapted to the local school situation and used by the local school staff in starting, extending, or refining its improvement activities. There are alternative strategies that the principal and the local school educational improvement committee use in leading and coordinating their school's improvement activities. Third, there are printed and audiovisual materials that are designed for use by local school staffs in gaining information about WRISE and by university professors to provide information to their students. The materials consist of 10 filmstrips, 9 school-experiences audiocassettes, one textbook for use by local school staffs and university students, an improvement leader's manual and a learning guide for use by a local school staff, and a college instructor's guide and a learning guide for use by university students. Fourth, there is a plan for dissemination and knowledge utilization. Each of these elements is explained further in the following description of the project procedures and time schedule.

The present project was planned in 1976-77, taking into account both the national scene and the activities that had been completed at the elementary and secondary school levels at the Wisconsin Center. In this regard, many school districts wanted the Center to extend its improvement-oriented activities to the secondary school level. In addition, NIE included the secondary school in its programmatic research program.

The main aim of the present project was to find means of enabling the staffs of local secondary schools to improve student achievement, particularly in English, mathematics, and reading. To achieve this aim, the project staff, the R & D Center director, and the NIE program officer agreed that research would be conducted to determine means of improving secondary education and that materials would be developed for use in educating persons regarding improvement concepts and practices. Another point of agreement was to avoid a problem that was widely experienced in earlier improvement programs in secondary education in the 1960's. The problem as experienced by the Ford Foundation was that promising innovative programs funded by the Foundation ceased shortly after the funding and technical support ceased. Accordingly, the improvement-oriented research and summative evaluation activities of the present project were planned and budgeted so as to provide for a maximum amount of initiative by, and no monetary support to, the participating local schools and universities. As would be expected, not providing funding to the participating schools and universities affected the conduct of the research and evaluation activities, including the selection of the schools and universities.

Rationale

The decade of the 1970's was a troubling period in American secondary education. In the first half of the decade attention was directed toward making the secondary school curriculum more relevant in terms of career education and meeting other educational needs of youth. Simultaneously, a massive effort was directed toward extending educational opportunities for minority groups, females, bilingual students, and students with handicapping conditions. Concurrent with these changes, the first two assessments by the National Assessment of Educational Progress showed that the achievements of 17-year-olds in the academic subjects declined sharply from late 1960 to mid-1970. The decline was equally pervasive but less sharp for 13-year-olds. By the middle of the decade, calls for better discipline and higher student achievement were being heard.

Although many policies emerged affecting secondary schools in the early 1970's, relatively little research was conducted at the secondary school level in comparison with the elementary. As one example, the Wisconsin Center for Education Research conducted extensive basic and applied research and also carried out nationwide improvement activities at the elementary school level in the period from 1965 through 1976. On the other hand, only two small secondary school projects were carried out at the Center during the period 1972-76. These secondary projects produced creative ideas, but the ideas were not transformed into products that could be diffused nationally.

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The Wisconsin Program for the Renewal and Improvement of Secondary Education (WRISE) is a program for improving secondary education. The program and means of using it are explained in books, filmstrips, and school-experiences audiocassettes. The effects on student outcomes of local school staffs implementing the program were determined by conducting improvement-oriented research cooperatively with five schools from 1977-78 through 1980-81. The materials were developed in 1979 and 1980. The usability, effectiveness, and other attributes of the materials were ascertained by conducting summative evaluations both in local schools and in universities in 1980-81.

In this paper the rationale of the project is presented first. This is followed with a short description of the four main elements of WRISE. Then the research and product development activities are explained. The next part of the paper is given to a summary of the results of the improvement-oriented research. The results of the summative evaluations in local schools and universities are presented last. The complete report of the cooperative research and of the summative evaluation will appear as publications of the Wisconsin Center later in 1982.

Project Procedures and Time Schedule

The four sets of project activities and the time schedule for starting and completing each set are outlined in Table 1. An understanding of the relationship among the activities is essential for interpreting the results of the research and summative evaluation.

The WRISE conceptual design was formulated at the time the project proposal was prepared for submission to NIE. The design was based on a synthesis of the literature and input from practitioners and professors. It consists of 10 comprehensive objectives and related enabling objectives. The enabling objectives provide illustrative means of achieving each comprehensive objective. The comprehensive objectives were used in planning the cooperative improvement-oriented research with the local schools. The objectives indicated possible areas of improvement that each school might undertake. The objectives also provided the basis for determining the content of each chapter of each book, each filmstrip, and each school-experiences audiocassette.

The cooperative research and the related improvement strategies were planned with the schools in 1977-78. Agreement was reached with respect to the role of each school and the researcher in conducting the research and carrying out the improvement activities. We shall return to these arrangements later in the discussion of the research and improvement strategies.

Table 1

Time Schedule for Major Activities

1976-77	Formulate a conceptual design for the improvement and renewal of secondary education. Complete plans for cooperative longitudinal improvement-oriented research with 2 middle schools, 1 junior high school, 2 high schools. Outline the minimal materials needed to explain the design and its implementation. Develop a plan for the formative and summative evaluation of the design, processes, and materials. Develop a tentative plan for dissemination and knowledge-utilization.			
	Carry out improvement-oriented research.	Develop materials.	Evaluate materials formatively and summatively.	Plan a strategy of dissemination and knowledge utilization.
1977-78	Plan research and related improvement strategies with 5 schools. Schools collect baseline data on 4200 students: educational achievement, attitudes, attendance, tardiness, etc.	Start script writing for first FILMSTRIP. Prepare TEXTBOOK outline.		
1978-79	Schools analyze 1977-78 data; plan and implement minor improvement activities 2nd semester; collect 2nd year data.	Start FILMSTRIP production. Complete 1st AUDIOCASSETTE. Complete 5 TEXTBOOK chapters. Start writing GUIDES and MANUAL.	Pilot test completed materials in local schools and universities.	
1979-80	Schools analyze 1978-79 data; plan and carry out improvement activities; collect 3rd year data.	Complete last (10th) FILMSTRIP, last 9 AUDIOCASSETTES, and fieldtest edition of TEXTBOOK, GUIDES, and MANUAL.	Continue formative evaluation of materials.	Initiate planning of dissemination and knowledge utilization. Prepare outline for education improvement leader's workshop.
1980-81	Schools analyze 1979-80 data; plan and carry out improvement activities; collect final data 5/81.		Conduct summative evaluation in local school and university settings, last data collected 8/81.	Conduct two improvement leader's workshops. Use Wisconsin as "model" improvement state.
1981-82	Project analyzes all data collected by schools on 4200 students and submitted to project; prepares final report relating student outcomes to improvement activities and other events occurring in the school.	Make final revisions of materials; have material produced in final version.	Analyze data; prepare final report.	Conduct 2 workshops and 1 follow-up seminar for persons who attended workshops.

We now turn to the development and formative evaluation of the materials that began in late 1978 and were completed in 1980. A brief description of the materials is provided here to show the relationship of the WRISE concepts to the materials.

With minor exceptions, each of the comprehensive objectives is explained in a chapter of the textbook, The Renewal and Improvement of Secondary Education: Concepts and Practices. Attainment of each objective in one or more middle schools and high schools is depicted in a filmstrip that is correlated with the textbook chapter. In each filmstrip exemplary practices in at least one middle school and one high school related to the particular objective are depicted. A correlated school-experiences audiocassette was prepared for each objective. Most of the audiocassettes have two segments of about 10 minutes on each side, one side being devoted to the middle school and the other side to the high school. A teacher and another representative from a school explain their practices related to the particular objective in each segment.

The six-step improvement process and strategies for planning and starting improvement activities related to each comprehensive objective are explained in the Educational Improvement Leader's Manual. Suggestions are offered to the principal and the improvement committee of the local school.

A Learning Guide for the Wisconsin Program for the Renewal and Improvement of Secondary Education: School Staff Members is intended for use by local school staff members when studying individually, in pairs, or in small groups. Use of the learning guide enables local staff members to gain information with a minimum amount of external assistance or instruction. The questions and activities in each chapter assume that the staff members have access to the correlated filmstrips, school-experiences audiocassettes, and textbook.

A College Instructor's Guide for the Wisconsin Program for the Renewal and Improvement of Secondary Education is intended for use by professors who offer a credit or noncredit course dealing with some aspect of secondary education. It, too, is organized into 10 chapters corresponding to the textbook chapters. Each chapter has objective-type questions that may be used in preparing pretests or posttests.

A Learning Guide for the Wisconsin Program for the Renewal and Improvement of Secondary Education: College Students is designed for use by college students when studying individually, in pairs, or in small groups, usually outside the regularly-scheduled class period.

The formative evaluation of the materials began in 1978-79. The pattern of formative evaluation was to submit each item for review to practitioners and experts in various fields, and then to produce it in an iterative cycle of develop, test, and revise.

The summative evaluation of the WRISE materials was conducted in local school settings and in universities in 1980-81. The last data collection occurred in two universities in the summer of 1981.

Wisconsin served as a pilot state in which to formulate and try out dissemination and knowledge-utilization activities. Two workshops for improvement leaders were conducted in 1980-81 and two more in 1981-82. A seminar for the persons who attended the prior workshops is planned for the spring of 1982. The seminar is intended to enable the participants to extend their knowledge of improvement processes and activities and also to strengthen their planning and evaluation skills.

Summary of Improvement-Oriented Research

Specific Objectives

Cooperative improvement-oriented research was carried out with two middle schools, one junior high school, and two senior high schools. This research had three main objectives. One objective was to determine how well each school staff could adapt and implement the educational improvement strategy recommended by the project. A second purpose was to determine the effects of each school's improvement activities on selected areas of student achievement. A third objective was to determine how well the changes that occurred in student achievement during the successive years after 1977-78 could be accounted for on three bases: planned changes that were made annually by each school staff in accordance with the recommended improvement strategy, planned changes that were not

directed specifically toward the improvement of the selected student outcomes, and unanticipated events that occurred and that influenced the selected student outcomes.

It was assumed that implementing the improvement strategy would have two main effects on educational achievement in each school, provided there were not offsetting negative unanticipated events or negative non-specific changes in the school environment:

1. The mean educational achievement of each successive class in the areas selected for improvement would be as high as, or higher than, the mean of the classes of 1977-78, taking into account differences between the successive classes in mental ability.

2. The mean educational achievement of each successive longitudinal group of students would be as high or higher than the mean of the prior group, taking into account differences between the successive longitudinal groups in mental ability.

Three achievement areas selected for attention were English, reading, and mathematics.

Participating Schools

Two middle schools participated in the cooperative research. Steuben Middle School is a central-city school of Milwaukee, Wisconsin, and enrolls about 50 students in Grade 6 and about 400 in each Grade 7 and Grade 8. About equal proportions of the student population are black or white. Webster Transitional School of Cedarburg, Wisconsin, enrolls about 750 students in Grade 6, 7, and 8. It is a suburban school with a white child

population. Carl Sandburg Junior High School of Mundelein, Illinois, enrolls about 300 students in Grades 7 and 8. It has some of the properties of both a rural and a suburban area and its student body is white. Hood River Valley High School, Hood River, Oregon, enrolls about 800 students in Grades 10, 11, and 12. It has the characteristics of a rural, small-town area. A small percentage of its students are Oriental and the remainder are white. Cedarburg High School of Cedarburg, Wisconsin, enrolls about 1250 students in Grades 9, 10, 11, and 12. Its student body is predominantly white.

A large central-city high school was selected in 1976-77 and opened for the first time in the fall of 1977-78 in a new building. However, its enrollment and teaching staff did not stabilize until two years later in 1979-80. Accordingly, no information on student outcomes could be collected during the first two years and the decision was made not to include it in the present study.

Research Strategy and Related Improvement Strategy

The research strategy used in this project is now examined from the standpoint of how the participating schools proceeded and the methods employed by the project in analyzing the data collected throughout the project. Because the improvement activities of the school were related directly to the annual results of the research, the research and improvement strategies of the participating schools are presented first, and then the data analysis by the project is presented.

The steps of the research strategy carried out in the five schools follow.

1. Each school gathered information on all its students at 12-month intervals for three or four years. The initial plan was for three years but four schools continued for four years. Each school determined the particular achievement and other information to be gathered.

2. Each school summarized the achievement and mental ability information for each grade for the first year, the baseline year, and for each successive year as follows: The students of each grade were arranged into fourths on the basis of mental ability, using the group mental ability test administered in the particular school. The mean percentile rank for mental ability and the corresponding mean percentile rank in each subject field for each quarter of the students were computed.

3. Each school annually compared the mean mental ability and the mean achievement in each subject field for the students of each quarter of each grade with the information for the baseline year and each year following.

The project provided assistance to each school in formulating the preceding strategy during a planning period and also in later implementing it. More assistance was given in the first two years of the project than in the last two years. The steps of the improvement strategy used by the staffs of the five schools follow.

1. Each staff annually examined the quantitative data and the teachers' judgments to identify possible improvements to be made in each subject field

by individual students, the students of each quarter in mental ability, and the students of the entire grade. They also identified possible improvement in attitudes, self-concepts, and school attendance.

2. Each staff set improvement goals for some individual students, for some of the quarters in mental ability of each grade, and for the entire grade.

3. Each staff implemented plans to achieve the goals.

4. Each staff kept a record of the improvement plans and of unanticipated events that occurred and that may have influenced student outcomes.

5. Each staff related their goal attainment to the planned changes and the unanticipated events.

Each school annually provided the project tables summarizing student achievement and other student outcomes and a copy of the test publisher's computer printouts of each individual student's scores. The project used the individual student's scores in the final data analysis. The main steps in the final data analysis follow.

1. The mean achievement of the students of each grade each successive year in each subject field was compared with the mean achievement of the students of the preceding years, including the baseline year. The direction of the change from year to year and the level of statistical significance were determined. The comparisons were made for each total grade and for boys and girls. In this summary, only the findings for the total grades are presented since the findings regarding the boys and girls separately do not change the results for the total group.

2. The mean achievement level of each longitudinal cohort, the gain made by each longitudinal cohort from one grade to the next, and the mean gain of each quarter of each cohort in mental ability were determined. Comparisons of the achievements of the cohorts were made.

3. The results of the preceding analyses were related to the planned improvement activities of the school and to the unanticipated events that occurred in the school that might have influenced student achievement. Only the most important relationships are indicated in this summary.

We should note that the first data collected by four of the schools in 1977-78 (all except Cedarburg High School) were not summarized until the summer or early fall of 1978. In the first semester of 1978-79, teachers examined the summary data. With this time schedule for data analyses, only minor improvements could be planned and implemented in the second semester of 1978-79. Accordingly, the classes of 1978-79 were not expected to achieve higher than the baseline classes of 1977-78. Moreover, the improvement strategy involving goal setting was not carried out systematically in any of the schools until 1979-80. Thus, if the improvement strategy was effective, the achievement was expected to be substantially higher for the classes of 1979-80 and 1980-81 than for 1977-78. In the same way, the second longitudinal cohort that entered in 1978-79 was not expected to achieve much higher than the cohort that entered in 1977-78.

Results

As was noted earlier, the purpose here is to present the most important findings regarding the achievement of the students in English, reading, and mathematics. The many findings pertaining to males and females are not given here. Similarly, the findings regarding outcomes in the affective domain are not. In general, the findings related to the affective domain were positive and no unexpected sex differences were found. The data on which these findings are based is included in the complete report of this cooperative research that is being prepared.

Steuben Middle School. Table 2 gives a summary of the findings regarding the mean achievement of four successive Grade 7 and Grade 8 groups of students at Steuben Middle School on whom mental ability scores were available. Differences among the groups that were significant at or above the .05 level are indicated. The adjusted means for each group and the national percentile rank equivalent to each adjusted mean are indicated. The achievement information is based on the administration of the Metropolitan Achievement Tests in May of each of the four years. The mental ability information is based on the results of the Otis-Lennon Mental Ability Test that was administered when the students were in Grade 5. Analysis of covariance was used in determining the significance of the differences between the successive groups. The results that follow are based mainly on the percentile ranks for 1977-78 and 1980-81 and on the comparison of the significance of the differences of the adjusted means of the successive groups of students of Grade 7 and Grade 8.

Table 2. **Summary of Findings Regarding Mean Achievement of Four Successive Grade 7 and Grade 8 Groups, Percentile Ranks Corresponding to Adjusted Achievement Means, and Mental Ability Percentile Rank:** Steuben Middle School.

	Comparisons of Successive Groups					
	1978-79 vs 1977-78	1979-80 vs 1977-78	1980-81 vs 1977-78	1979-80 vs 1978-79	1980-81 vs 1978-79	1980-81 vs 1979-80
Grade 7						
Reading Total	S-	NS	NS	S+	S+	NS
Language	S+	S+	S+	NS	S+	S+
Spelling	NS	NS	S+	NS	NS	NS
Math Total	NS	S+	S+	NS	S+	NS
Grade 8						
Reading Total	NS	NS	S+	NS	NS	S+
Language	NS	NS	S+	NS	S+	NS
Spelling	S+	S+	S+	NS	NS	NS
Math Total	NS	S+	S+	NS	S+	NS

	Adjusted Means and Equivalent Percentile Ranks							
	1977-78		1978-79		1979-80		1980-81	
	$\bar{X}$	%ile	$\bar{X}$	%ile	$\bar{X}$	%ile	$\bar{X}$	%ile
Grade 7								
Reading Total	43.44	34	39.92	29	42.66	34	43.11	34
Language	38.21	30	41.17	32	42.09	36	45.27	42
Spelling	26.17	40	27.31	44	26.74	44	27.69	48
Math Total	50.75	30	54.95	36	60.14	44	60.06	44
Average Student N	223		323		289		304	
Grade 8								
Reading Total	48.98	30	50.03	32	48.28	28	52.46	35
Language	44.66	30	45.37	30	46.77	32	48.08	34
Spelling	27.64	32	29.25	36	29.74	38	30.57	39
Math Total	60.45	32	62.53	34	65.43	36	68.38	42
Average Student N	228		237		267		224	

S+ The mean of the group of the later year was significantly higher than the mean of the group of the earlier year.

S- The mean of the group of the later year was significantly lower than the mean of the group of the earlier year.

The mean percentile rank of the Grade 7 students in reading was 34 in 1980-81 and 34 in 1977-78. The mean percentile rank of the Grade 7 students in language in 1980-81 was 42, while in 1977-78 it was 30. The percentile ranks in spelling for 1980-81 in comparison with 1977-78 were 48 and 40, while those for mathematics were 44 and 30, respectively. The adjusted means of the Grade 7 students of 1980-81 in comparison with those of 1977-78 were significantly higher in language, spelling, and math total, but not significantly different in reading total.

The mean percentile ranks for the Grade 8 students in 1980-81 in comparison with 1977-78 were 35 and 30 in reading, 34 and 30 in language, 39 and 32 in spelling, and 42 and 32 in mathematics. The adjusted means of the Grade 8 group of 1980-81 were significantly higher than the means of the 1977-78 group in all four areas.

The preceding seven significantly higher mean achievements as well as the higher percentile ranks are accounted for in terms of the Steuben staff implementing the recommended improvement strategy with increasing effectiveness, particularly during the last two years. More specifically, concrete goals in terms of higher student achievement in each subject field were set by the staff for 1979-80 and 1980-81, and related plans were made and carried out to achieve each goal. The achievement of the students might have been higher had it not been for a considerable change in the staff from year to year and the necessity of acquainting the incoming staff with the improvement strategy and helping them to build skills in implementing it.

We note that the adjusted means of the Grade 7 group in reading for 1978-79 was significantly lower than it was for the group of 1977-78; but that it was significantly higher each later year than it was in 1978-79. The significantly lower achievement is accounted for by the fact that a large change was made in the curriculum and instructional pattern in reading during 1978-79 that was not directly a part of the Steuben improvement strategy. A reading laboratory that was functioning in 1977-78 was changed to a language laboratory and other changes were made in the instructional pattern employed both in the language laboratory and in the developmental reading program carried out in the regular classrooms. These changes had a greater negative effect on the Grade 7 reading achievement in 1978-79 than on the Grade 8 achievement. All of the Grade 7 students received daily instruction in developmental reading, whereas only about 20% of the Grade 8 students did.

Table 3 presents a summary of findings regarding the mean gains made by each of the three successive Grade 7→8 longitudinal cohorts and the comparisons of the adjusted means of the two cohorts based on the average of their scores when in Grade 7 and in Grade 8. The students of the three cohorts gained significantly in reading, language, spelling, and math from Grade 7 to Grade 8. Moreover, the mean achievement of each of the three successive cohorts was either significantly higher than, or not significantly different from, the mean achievement of the previous cohort, with the exception of Cohort 1 in reading. Cohort 1, which

Table 3. Summary of Findings Regarding Mean Gain and Mean Achievement of Three Successive Longitudinal Cohorts: Steuben Middle School

	Comparison of Mean Gain Made by Each Successive Cohort from Grade 7 to Grade 8								
	Cohort 1			Cohort 2			Cohort 3		
	$\bar{X}$ Gr. 7	$\bar{X}$ Gr. 8	$\bar{X}$ Gain	$\bar{X}$ Gr. 7	$\bar{X}$ Gr. 8	$\bar{X}$ Gain	$\bar{X}$ Gr. 7	$\bar{X}$ Gr. 8	$\bar{X}$ Gain
Reading Total	46.66	53.53	6.87*	39.36	48.43	9.07*	43.14	52.32	9.18*
Language	40.64	48.23	7.59*	41.35	46.13	4.78*	42.75	48.12	5.37*
Spelling	26.85	29.94	3.09*	27.43	29.66	2.23*	26.80	30.69	3.89*
Math	53.30	65.41	12.11*	55.51	64.90	9.39*	61.05	67.99	6.94*
Student N	191			247			216		

	Quarter Making Greater Gain			Cohort with Higher Average Achievement		
	Cohort 1	Cohort 2	Cohort 3	Cohort 2 vs Cohort 1	Cohort 3 vs Cohort 1	Cohort 3 vs Cohort 2
Reading Total	Q3, Q2 > Q1	Q4, Q3 > Q1	NS	Cohort 1	NS	Cohort 3
Language	NS	NS	NS	Cohort 2	Cohort 3	NS
Spelling	NS	NS	NS	NS	NS	NS
Math	NS	NS	NS	Cohort 2	Cohort 3	Cohort 3

* The gain from Grade 7 to Grade 8 was statistically significant.

started Grade 7 in 1977-78, achieved significantly higher in reading than Cohort 2 which started Grade 7 in 1978-79. As pointed out earlier, a large change was made in the reading program in 1978-79. This change had more effect on Grade 7 than Grade 8. The fact that the later cohorts had significantly higher adjusted means than the prior ones with this one exception supports the earlier conclusion regarding the effectiveness with which the Steuben staff implemented the recommended improvement strategy.

It will be recalled that goals were set for quarters of classes that were achieving below expectancy in a subject field based on mental ability. The Steuben staff starting in 1978-79 attempted to raise the reading achievement of the two higher quarters in mental ability. The upper quarters of Cohort 1 and Cohort 2 did gain significantly more in reading than the lowest quarter. With this exception, we see that there was no significant difference in the amount of gain made by each of the four quarters in mental ability in the other subject fields. Based on this finding we conclude that the lowest quarter of the class in mental ability gained as much as any of the other three quarters. This reflects the emphasis given by the Steuben staff to the lowest one-quarter of the students in its Title 1 programs and in other programs for students with learning handicaps.

In the preceding presentation, planned improvements that were made in accordance with the recommended improvement strategy are mentioned. The same pattern of reporting is carried out for the other four schools. The

many specific planned changes directed toward these selected student outcomes that were made at Steuben, the planned changes not directed toward these outcomes, and unplanned events are included in the final report of this cooperative research project.

We may now summarize the relationship of the implementation of the WRISE improvement strategy and processes by the Steuben staff to the changes in student achievement at Steuben. The information provided by Steuben to the project indicated that the majority of the staff involved in providing the instruction in reading, English, and mathematics were implementing many educational practices in accord with WRISE concepts and practices in 1977-78. However, they used the results of their testing program of 1977-78 and 1978-79 to set concrete achievement goals for individual students and groups of students in 1979-80 in accord with the recommended improvement strategy. They continued the goal setting in 1980-81. The Steuben staff worked out their own improvement activities to achieve the goals with very little consultation or assistance from the project.

The main findings regarding student outcomes were that 19 of the 40 adjusted means of the Grade 7 and Grade 8 groups of 1979-80 and 1980-81 in reading, language, spelling, and mathematics were significantly higher than the adjusted means of the earlier groups of 1977-78 and 1978-79; 21 were not significantly different, and none were significantly lower. Moreover, the students of each of the three longitudinal cohorts gained significantly from Grade 7 to Grade 8 in each achievement area.

With the exception of Cohort 1 in reading, the mean achievement of each later cohort was significantly higher than that of an earlier cohort in 6 of 12 comparisons and not significantly different in the other five. Accordingly, we may conclude that adaptation and implementation of the objectives of the WRISE design and the WRISE processes and strategies were accompanied with significantly higher student achievement in reading, English, and mathematics. Higher achievement might have accrued had not changes in the teaching staff and a loss of instructional aides occurred even though there was not a decrease in student enrollment.

Carl Sandburg Junior High School. Carl Sandburg Junior High School, according to the plan initially worked out in 1977-78, participated in the research for three years. A different achievement test battery was used in 1980-81.

Table 4 gives a summary of the findings regarding the mean achievement of three successive Grade 7 and Grade 8 classes of Carl Sandburg Junior High School. Differences among the means of the groups that were significant at or above the .05 level are indicated. The adjusted means for each group and the national percentile rank equivalent to each adjusted mean are indicated. The achievement information is based on the administration of the Metropolitan Achievement Tests in May of each of the three years. The mental ability information is based on the Otis-Lennon Mental Ability Test that was administered in May of each year to the Grade 7 students. Analysis of covariance was used in determining the significance of the differences between the

Table 4. **Summary** of Findings Regarding Mean Achievement of Three Successive Grade 7 and Grade 8 Groups, Percentile Ranks Corresponding to Adjusted Achievement Means, and Mental Ability Percentile Rank: Carl Sandburg Junior High School

	Comparison of Successive Classes			Adjusted Means and Equivalent Percentile Ranks					
	1978-79 vs 1977-78	1979-80 vs 1977-78	1979-80 vs 1978-79	1977-78		1978-79		1979-80	
				$\bar{X}$	%ile	$\bar{X}$	%ile	$\bar{X}$	%ile
Grade 7									
Reading Total	NS	NS	NS	92.96	62	92.36	61	93.36	64
Language	NS	NS	NS*	94.76	56	94.62	56	97.09	62
Spelling	NS	S+	S+	95.12	61	95.20	61	98.54	69
Math Computation	NS	S+	S+	95.31	44	96.68	47	99.79	59
Math Concepts	NS	S+	NS	88.58	49	90.44	54	91.33	58
Math Problem Solving	NS	NS	NS*	95.56	49	95.72	49	97.91	54
Math Total	NS	S+	S+	98.22	49	99.32	53	101.72	61
Average Student N				173		149		157	
Grade 8									
Reading Total	NS	NS	NS	97.96	60	97.37	59	97.75	60
Language	NS	NS	NS	100.80	60	99.17	56	99.51	57
Spelling	NS	NS	NS	99.86	54	98.11	50	99.14	52
Math Computation	NS	S+	S+	98.77	39	98.19	36	101.74	53
Math Concepts	NS	NS	S+	91.31	42	90.39	38	93.44	49
Math Problem Solving	S-	NS	S+	99.13	44	96.61	37	100.41	47
Math Total	NS	S+	S+	101.68	45	100.12	39	103.99	50
Average Student N				188		164		159	

S+ The mean of the class of the later year was significantly higher than the mean of the class of the earlier year.
S- The mean of the class of the later year was significantly lower than the mean of the class of the earlier year.
* The adjusted mean was substantially higher for 1979-80 than for either prior year.

successive groups. The summary findings that follow are based on the percentile ranks and on the comparison of the significance of the differences among the adjusted means of the successive groups of students.

The mean percentile rank of the Grade 7 students in reading was 64 in 1979-80 and 62 in 1977-78. The mean percentile rank of the Grade 7 students in language in 1979-80 was 62 while in 1977-78 it was 56. The percentile ranks in spelling for 1979-80 in comparison with 1977-78 were 69 and 61. The comparable percentile ranks for 1979-80 and 1977-78 were 59 and 44 in math computation, 58 and 49 in math concepts, 54 and 49 in math problem solving, and 61 and 49 in math total. The adjusted means of the Grade 7 students of 1979-80 in comparison with those of 1977-78 were significantly higher in spelling, math computation, math concepts, and math total, but not significantly different in reading total, language, and math problem solving.

The mean percentile ranks of the Grade 8 students in 1979-80 in comparison with 1977-78 were 60 and 60 in reading, 57 and 60 in language, 54 and 52 in spelling, 53 and 39 in math computation, 49 and 42 in math concepts, 47 and 44 in math problem solving, and 50 and 45 in math total. A small drop occurred in each achievement area from 1977-78 to 1978-79. However, an increase occurred in each area from 1978-79 to 1979-80, and the adjusted means in 1979-80 in comparison with 1978-79 were significantly higher in the four math areas.

The significantly higher adjusted means as well as the higher percentile ranks of the Grade 7 class in spelling and the Grade 7 and Grade 8 classes in mathematics in 1979-80 are accounted for in terms of the Sandburg staff implementing the recommended improvement strategy with considerable effectiveness in 1979-80. Many changes not directed toward increasing student achievement in these subject fields were made in 1978-79 that required time and attention of the principal and teachers. The mean achievement of the students in reading, language, and spelling might have been higher had these changes not been made. In addition, two of four language arts teachers resigned at the end of the 1977-78 school year.

We note that the mean of the Grade 8 class in math problem solving for 1978-79 was significantly lower than it was for the class of 1977-78. This significantly lower achievement cannot be related to the planned changes that were made in the second semester of 1978-79 to improve this area of achievement. These planned changes, continued into 1979-80, are presumed to have been started too late in the school year to influence the downward trend in mathematics achievement.

Table 5 presents a summary of findings regarding the mean gains made from Grade 7 to Grade 8 by each of the two longitudinal cohorts and the comparisons of the adjusted means of the two cohorts. The adjusted means are based on the average of the scores when the students were in Grade 7 and in Grade 8. The students of each cohort gained significantly from

Table 5. Summary of Findings Regarding Mean Gain and Mean Achievement for Two Successive Longitudinal Cohorts: Carl Sandburg Junior High School

	Comparison of Mean Gain Made by Each Cohort from Grade 7 to Grade 8						Quarter Making Greater Gain		Cohort with Higher Average Achievement
	Cohort 1			Cohort 2					
	$\bar{X}$ Gr. 7	$\bar{X}$ Gr. 8	$\bar{X}$ Gain	$\bar{X}$ Gr. 7	$\bar{X}$ Gr. 8	$\bar{X}$ Gain	Coh. 1	Coh. 2	
Reading Total	93.20	99.13	5.93*	92.11	98.60	6.49*	NS	NS	NS
Language	96.76	100.57	3.81*	95.99	100.25	4.26*	NS	NS	NS
Spelling	95.35	99.01	3.66*	94.50	100.04	5.54*	NS	Q1	NS
Math Computation	94.99	98.94	3.95*	96.11	102.16	6.05*	NS	NS	Coh. 2
Math Concepts	88.04	91.43	3.39*	90.07	93.30	3.23*	NS	NS	Coh. 2
Math Problem Solving	94.97	97.71	2.74*	95.01	100.51	5.50*	NS	NS	Coh. 2
Math Total	97.71	101.13	3.42*	98.77	104.16	5.39*	NS	NS	Coh. 2
Student N	136			134					

* The gain from Grade 7 to Grade 8 was statistically significant.

achievement areas. The Sandburg staff worked out their own improvement activities to achieve the goals with very little consultation or assistance from the project.

We saw in Table 4 that 13 of the 28 adjusted means of the Grade 7 and Grade 8 classes of 1979-80 in reading, language, spelling, and the four mathematics areas were significantly higher than the adjusted means of the earlier classes of 1977-78 and 1978-79; 15 were not significantly different, and none were significantly lower. The students of both longitudinal cohorts gained significantly from Grade 7 to Grade 8 in all seven achievement areas. The mean achievement of Cohort 2 was significantly higher than that of Cohort 1 in the four math areas and it was not significantly different in the other three areas. Accordingly, we conclude that adaptation and implementation of the objectives of the WRISE design and the WRISE processes and strategies were accompanied with significantly higher achievement by the students of Grade 7 and Grade 8 in mathematics, with significantly higher achievement by the students of Grade 7 in language and spelling, and with maintaining a stable level of achievement by the Grade 7 students in reading and by the Grade 8 students in reading, language, and spelling. To achieve significantly higher reading achievement the Sandburg staff will need to improve the reading instruction of the upper quarters of its students as well as continuing to give attention to the lowest quarter.

Grade 7 to Grade 8 in reading, language, spelling, and the four math areas. Moreover, the adjusted mean of Cohort 2 was either significantly higher than, or not significantly different from, the mean of Cohort 1 in any area. The fact that the later cohort had the same or significantly higher mean achievement supports the earlier conclusion regarding the effectiveness with which the Sandburg staff implemented the recommended improvement strategy starting in the second semester of 1978-79.

We now turn to the comparative gains made by the quarters of each cohort in mental ability. The lowest quarter of each cohort in mental ability gained as much as any of the other three quarters in all subjects except in spelling where it gained more. This pattern of gains reflects the emphasis given by the Sandburg staff to the lowest achievers of the Grade 7 and Grade 8 classes in its Title I program and in its programs for students with exceptional educational needs.

The relationship of the changes in student achievement to the implementation of the WRISE improvement strategy and processes by the Carl Sandburg Junior High School staff is now summarized. The information provided by Sandburg to the project indicated that the majority of the staff involved in providing the instruction in reading, English, and mathematics were already implementing many educational practices in accord with WRISE concepts and practices in 1977-78. However, it was not until 1979-80 that they used the results of their testing program of 1977-78 and 1978-79 to set general improvement goals in the various

Webster Transitional School. The achievement test information is based on a 306-item locally-constructed, objective-referenced, language test; a 250-item locally-constructed, objective-referenced, mathematics test; and the Gates-MacGinitie Reading Tests. The language test measured student achievement related to parts of speech and sentences. The mathematics test had six subscores and a total score. The mathematics subtests were domain-referenced and varied greatly in difficulty in accord with the purposes for which they were constructed. For example, the Grade 6 students got very few items correct on a subtest introducing new ideas, whereas on a review test they scored very high. Accordingly, only the total math score was analyzed since the same test was used in all Grades 6, 7, and 8. Analysis of covariance was used in determining the significance of the differences between the classes with mental ability the covariate.

Webster used the results of the locally-constructed tests in arranging instruction for its students in all aspects of English and mathematics and also in determining its improvement activities from year to year. The results of the standardized Gates-MacGinitie Reading Tests were used to only a very limited extent in determining improvement activities in reading. The Iowa Short Form of Mental Ability was administered to the students when they were in Grade 6.

A note regarding the grades included in the analysis is necessary. The Grade 6 results start with 1977-78, the Grade 7 with 1978-79, and

the Grade 8 with 1979-80. The results for Grade 6 are not presented for 1980-81 because different tests were administered to the Grade 6 students in 1980-81 in accordance with the plan initially worked out for the cooperative research. The results are not presented for the earlier years for Grade 7 and Grade 8 because the scores of the individual students were not available to the project. In this regard, summary tables were provided annually to the project by Webster for the Grade 8 students of 1977-78 and 1978-79. After preparing the summary tables, Webster sent each individual student's complete set of scores for Grades 6, 7, and 8 on a separate card for each student to Cedarburg High School. Webster did not keep a record of these scores. Not all of the cards for the first two groups of Grade 8 students could be retrieved from the high school for use in this final data analysis.

Table 6 gives a summary of the findings regarding the mean achievement of three successive Grade 6, three successive Grade 7, and two successive Grade 8 classes. Differences among the adjusted means that were significant at or above the .05 level were identified. The adjusted means for each group in all achievement areas and the national percentile rank equivalent to each adjusted mean for vocabulary and comprehension of the Gates-MacGinitie Reading Tests are indicated. The results that follow are based on the comparison of the significance of the differences among the adjusted means of the successive groups of students.

Table 6. Summary of Findings Regarding Mean Achievement of Three Successive Grade 6 Classes, Three Successive Grade 7 Classes, and Two Successive Grade 8 Classes, Percentile Ranks Corresponding to Adjusted Achievement Means, and Mental Ability Percentile Ranks: Webster Transitional School

	Comparison of Successive Classes						Adjusted Means and Equivalent Percentile Ranks					
	1978-79 vs 1977-78		1979-80 vs 1977-78		1979-80 vs 1978-79		1977-78		1978-79		1979-80	
	Fall	Spring	Fall	Spring	Fall	Spring	Fall	%ile	Spring	%ile	Fall	%ile	Spring	%ile
Grade 6														
Parts of Speech	NS	NA	NS	NA	NS	NA	80.73				82.86			
Sentences	NS	NA	NS	NA	NS	NA	9.15				7.48			
Language Total	NS	NA	NS	NA	NS	NA	90.61				90.57			
Mathematics	NS	NA	S+	NA	S+	NA	44.85				44.80			
Vocabulary	-	NS		NS		NS			54.27	67			54.67	68
Comprehension		S+		S+		NS			52.79	60			54.53	67
Average Student N	180													

	Comparison of Successive Classes						Adjusted Means and Equivalent Percentile Ranks					
	1979-80 vs 1978-79		1980-81 vs 1978-79		1980-81 vs 1979-80		1978-79		1979-80		1980-81	
	Fall	Spring	Fall	Spring	Fall	Spring	Fall	%ile	Spring	%ile	Fall	%ile	Spring	%ile
Grade 7														
Parts of Speech	NS	NS	S+	S+	S+	S+	119.27		158.07		120.20		162.68	
Sentences	NS	NS	S+	S+	S+	S+	20.46		43.32		22.38		45.74	
Language Total	NS	NS	S+	S+	S+	S+	139.75		201.10		142.77		208.42	
Mathematics	S+	NA	S+	NA	NS	NA	100.89				116.19			
Vocabulary		S+		S-		S-			54.25	67			55.61	71
Comprehension		S+		S+		S+			55.21	70			56.76	75
Average Student N	196													

	Comparison of Successive Classes		Adjusted Means and Equivalent Percentile Ranks					
	1980-81 vs 1979-80		1979-80			1980-81		
	Fall	Spring	Fall	%ile	Spring	%ile	Fall	%ile	Spring	%ile
Grade 8										
Parts of Speech	NA	S+			168.05				172.03	
Sentences	NA	NS			51.84				54.55	
Language Total	NA	S+			219.45				226.69	
Mathematics	S+	S+	159.03		206.97		168.66		214.97	
Vocabulary		S-			55.32	71			53.86	65
Comprehension		S+			54.87	69			58.33	80
Average Student N	207									

S+ The mean of the class of the later year was significantly higher than the mean of the class of the earlier year.
S- The mean of the class of the later year was significantly lower than the mean of the class of the earlier year.
NA Not administered.

The fall results are indicators of what the students had learned during their elementary school years and do not reflect the instruction they received at Webster. The fall adjusted means of the three successive Grade 6 classes in parts of speech, sentences, and language total were not significantly different, whereas two of the three adjusted means in mathematics were.

The spring adjusted means of the successive Grade 6 classes were significantly higher in 1978-79 and 1979-80 than in 1977-78 in comprehension but not in vocabulary. The equivalent percentile ranks in vocabulary for 1979-80 versus 1977-78 were 70 and 67 and in comprehension they were 67 and 60. These changes in the spring testing reflect the results of the first year at Webster as well as the prior elementary school years.

There are two different sets of adjusted means in parts of speech, sentences, and language total for the three successive Grade 7 classes, one for the three fall test administrations, and another for the spring administrations. The fall and spring adjusted means were not significantly different in 1979-80 than in 1978-79; however, they were significantly higher in 1980-81 than in either of the two prior years. A large increase occurred from the fall of 1979-80 to the fall of 1980-81. The Grade 7 spring adjusted means in mathematics was significantly higher in 1979-80 and in 1980-81 than in 1977-78, while the difference between 1980-81 and 1979-80 was not significant. The spring adjusted mean of the Grade 7 class of 1979-80 in vocabulary was significantly higher than the mean of

the class of 1978-79; whereas the adjusted mean of the 1980-81 class was significantly lower than the means of both the prior classes. The adjusted mean in comprehension of the Grade 7 class of each later year was significantly higher than the mean of the class of the earlier year. The corresponding percentile ranks for vocabulary for 1980-81 vs. 1978-79 were 60 and 67 while those for comprehension were 82 and 70.

With regard to Grade 8, the adjusted means of the class of 1980-81 for parts of speech and language total were significantly higher than the means of 1979-80; the mean was not significantly different for sentences. Both the fall and spring adjusted means of Grade 8 in mathematics were significantly higher in 1980-81 than in 1979-80. Turning to the Gates-MacGinitie Reading Tests we observe that the adjusted mean of Grade 8 class of 1980-81 for vocabulary was significantly lower than that of the class of 1979-80, whereas the mean was significantly higher in 1980-81 for comprehension. The percentile ranks for 1980-81 versus 1979-80 were 65 and 71 for vocabulary and 80 and 69 for comprehension.

The key year at Webster was 1979-80, the first year for which goals were set and related improvement activities were carried out by each academic team of teachers for their students. This was a very important element of their implementation of the recommended improvement strategy. The goal setting continued in 1980-81.

We observed in the preceding paragraphs that the Grade 6, 7, and 8 classes of 1979-80 and 1980-81 often achieved significantly higher than the

classes of the prior year or years, i.e., in 1 of 4 possible instances for Grade 6, 15 of 18 possible instances for Grade 7, and 4 of 6 for Grade 8. Moreover, only two significantly lower means were found, namely, Grade 7 and Grade 8 vocabulary. Accordingly, the improvement in achievement appears to be related to the goal setting and the related improvement activities that were planned and implemented to achieve the goals.

Table 7 presents a summary of findings regarding the mean gains made from Grade 6 to Grade 7 to Grade 8 by each of the two longitudinal cohorts on the locally-constructed tests. Table 5 also gives the comparisons of the adjusted means of the two cohorts. The adjusted means are based on the average of the scores when the students were in Grades 6, 7, and 8. At the time this summary was prepared, the analyses of the vocabulary and comprehension data were not complete; however, it appears that neither cohort gained significantly from year to year in vocabulary but both did in comprehension. On the other hand, each cohort gained significantly from Grade 6 fall to Grade 7 fall to Grade 7 spring to Grade 8 spring in parts of speech, sentences, and language total. Each cohort gained significantly from Grade 6 fall to Grade 7 fall to Grade 8 fall to Grade 8 spring in mathematics. The mean achievement of Cohort 2 was significantly higher than the mean of Cohort 1 in mathematics and not significantly different in parts of speech, sentences, and language total. These findings pertaining to the longitudinal cohorts support the earlier findings pertaining to the successive Grade 6, Grade 7, and Grade 8 classes.

Table 7. Summary of Findings Regarding Mean Gain and Mean Achievement for Two Successive Longitudinal Cohorts: Webster Transitional School

	Comparison of Mean Gain by Each Cohort							
	Cohort 1				Cohort 2			
	Fall Gr.6	Fall Gr. 7	Spring Gr.7	Spring Gr.8	Fall Gr.6	Fall Gr.7	Spring Gr.7	Spring Gr.8
Parts of Speech	84.36	123.55	161.61	171.39[1]	83.86	124.08	163.29	172.39[1]
Sentences	9.60	22.08	44.87	53.55[1]	7.51	23.69	45.86	54.75[1]
Language Total	93.34	145.47	206.33	224.99[1]	91.36	147.80	209.15	227.25[1]
Student N	163				166			
Mathematics	46.79	105.46	162.43	208.68[1]	44.48	119.84	170.12	215.08[1]
Student N	191				166			

	Quarter Making Greater Gain												
	Gr. 6, Fall to Gr. 7, Fall		Gr. 6, Fall to Gr. 7, Spring		Gr. 6, Fall to Gr. 8, Spring		Gr. 7, Fall to Gr. 7, Spring		Gr. 7, Fall to Gr. 8, Spring		Gr. 7, Spring to Gr. 8, Spring		Cohort with Higher Average Achievement
	Coh.1	Coh.2	Coh.1	Coh.2	Coh.1	Coh.2	Coh.1	Coh.2	Coh.1	Coh.2	Coh.1	Coh.2	
Parts of Speech	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Sentences	NS	Q4>Q1	Q3>Q1	Q3,Q4>Q1	Q3,Q4>Q1	Q4>Q1	NS	NS	NS	NS	NS	NS	NS
Language Total	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

	Quarter Making Greater Gain												
	Gr. 6, Fall to Gr. 7, Fall		Gr. 6, Fall to Gr. 8, Fall		Gr. 6, Fall to Gr. 8, Spring		Gr. 7, Fall to Gr. 8, Fall		Gr. 7, Fall to Gr. 8, Spring		Gr. 8, Fall to Gr. 8, Spring		Cohort with Higher Average Achievement
	Coh.1	Coh.2	Coh.1	Coh.2	Coh.1	Coh.2	Coh.1	Coh.2	Coh.1	Coh.2	Coh.1	Coh.2	
Mathematics	Q3,Q4>Q1 Q4>Q2	Q3,Q4>Q1	Q4>Q1	NS	NS	NS	NS	NS	Q1,Q2>Q4	Q1>Q3,Q4	NS	NS	Coh.2

[1]The gains for each comparison were statistically significant.

We may now examine the significant differences among the quarters of the cohorts in mental ability. In 36 comparisons involving parts of speech, sentences, and language total, five were statistically significant. In all five cases, the lowest quarter gained significantly less than either the third quarter, the fourth quarter, or both in sentences. The lowest or second lowest quarter of Cohorts 1 and 2 gained less than Quarter 3, Quarter 4, or both from Grade 6 fall to Grade 7 fall in mathematics and Quarter 1 of Cohort 1 gained significantly less than Quarter 4 from Grade 6 fall to Grade 8 fall. On the other hand, Quarter 1, 2, or both quarters of Cohorts 1 and 2 gained significantly more than Quarter 3, 4, or both from the fall of Grade 7 to the spring of Grade 8.

The relationship of the implementation of the WRISE improvement strategy and processes by the Webster staff to the changes in student achievement are now summarized. The information provided by Webster to the project indicated that the staff involved in providing the instruction in reading, English, and mathematics were already implementing many educational practices in accord with WRISE concepts and practices in 1977-78. However, they used the results of their testing program of 1977-78 and 1978-79 to set concrete achievement goals for individual students and groups of students in accord with the recommended improvement strategy starting in 1979-80. They continued the goal setting in 1980-81. The Webster staff worked out their own improvement activities to achieve the goals with very little consultation or assistance from the project.

The preceding presentation of findings showed that 14 of the 21 comparisons of the adjusted means of the Grade 7 groups of 1979-80 and 1980-81 in parts of speech, sentences, language total, and mathematics were significantly higher than the adjusted means of the earlier group of 1978-79 and the other seven were not significantly different. Four of the five for Grade 8 were significantly higher and the other was not significantly different. We may recall that only early fall testing was done with Grade 6. The students of each of the two longitudinal cohorts gained significantly from Grade 6 to Grade 7 to Grade 8 in each of the four achievement areas measured by the locally-constructed tests and the mean achievement of the later cohort was significantly higher than that of the earlier cohort in mathematics and not significantly different in the other three achievement areas.

The adjusted means in vocabulary, as measured by the Gates-MacGinitie Reading Tests, were not significantly different from year to year in the spring for the three Grade 6 classes; one was significantly higher and two were significantly lower for the Grade 7 classes; and the only one for the two Grade 8 classes was significantly lower. On the other hand, two of three adjusted means for the Grade 6 classes in comprehension, three of the three for the Grade 7 classes, and the only one for the two Grade 8 classes were significantly higher. Accordingly, we may conclude that the adaptation and implementation of the objectives of the WRISE design and the WRISE processes and strategies were accompanied with

significantly higher student achievement in reading comprehension, English, and mathematics at Webster Transitional School.

Cedarburg High School. There were marked differences in the conduct of the research at Cedarburg High School and the other four schools because of the nature of the improvement activities at Cedarburg High School. The main features of the research at Cedarburg High School are now explained.

There were two alternative programs of education at Cedarburg High School, starting with the entering Grade 9 class of 1977-78. One was a continuous progress program, called PACE, and the other was the traditional program that was continued. The PACE program was the one in which the recommended improvement strategy was implemented. About 100 of the students of each successive Grade 9 class enrolled in PACE and about 200 in the traditional program. The students in the PACE and traditional programs, with few exceptions, continued in the respective programs from Grade 9 onward through the successively higher grades.

In Grades 9 and 10 the PACE students were taught English, math, science, and social studies by an academic team of four teachers. These teachers served as their educational advisors. In Grades 11 and 12 there was an unanticipated interruption of the upward extension of the PACE program, and only part of the PACE students received their instruction in English, math, and social studies from PACE teachers, while the rest of the instruction was in traditional classes. The advising program also was not fully implemented with the PACE students in Grades 11 and 12. This

interruption of the extension of the PACE program upward one grade each year occurred when the assistant principal who was coordinating the PACE program resigned in 1978-79 to accept a principalship in a nearby high school. With his resignation the essential staffing, curriculum, instruction, and advising arrangements for Grade 11 were not planned in advance as initially projected. An assistant coordinator of the program, who also taught part time, was unable to carry out the extension of the program completely. Moreover, the principal of the school resigned early in the second semester of 1979-80. The PACE program was then administered by a district committee, headed by the superintendent of schools.

The PACE program for Grades 11 and 12 became a major consideration of the new principal of 1980-81 and the staff. Their task was clarified when the school board in 1980-81 outlined a refined PACE program to include all Grade 9 students, starting in 1981-82, and to be extended upward for all students by one grade each successive year.

The PACE program was the one in which the recommended improvement strategy was implemented. However, there was a serious limitation to its implementation. When setting the policy establishing PACE, the school board also indicated that the same curriculum, including content and textbooks, would be used in the required academic subjects of both the PACE and traditional programs in Grades 9 and 10. Accordingly, the PACE students were severely limited in how rapidly they could acquire the academic subject matter. The PACE teachers encouraged the students to learn the same subject matter more deeply or effectively, rather than to acquire more advanced knowledge.

From the preceding we see that there was only one baseline class in 1977-78, namely, Grade 9; and it consisted of the PACE and traditional students. The Grade 10 groups of 1978-79 became the baseline class for Grade 10. Accordingly, it was possible to compare four successive Grade 9, three successive Grade 10, and two successive Grade 11 groups of PACE and traditional groups. The main comparisons, however, were between the achievements of the PACE and traditional groups since the WRISE improvement strategy was implemented only in the PACE program.

Table 8 gives a summary of the findings regarding the mean achievement of four successive Grade 9, three successive Grade 10, and two successive Grade 11 PACE and traditional groups of students of Cedarburg High School. The achievement test information is based on the Iowa Tests of Educational Development that were administered in early October of each year. The Short Test of Educational Ability was administered in Grade 9 to measure mental ability. Analysis of covariance with mental ability the covariate was used in determining the significance of the difference in achievement between the successive grade groups and also between the PACE and traditional students. Comparisons of the achievement of the PACE and traditional groups of Grades 9, 10, and 11 in reading, language, and mathematics are indicated in Table 8 as are also the comparisons of the successive PACE and the successive traditional groups of each Grade 9, Grade 10, and Grade 11.

Differences between and among the adjusted means that were significant at or above the .05 level are shown. The adjusted means for the various groups in reading, language, and math and the national percentile

Table 8. Summary of Findings Regarding Mean Achievement of Four Successive Grade 9 PACE and Traditional Groups, Three Successive Grade 10 PACE and Traditional Groups, and Two Successive Grade 11 PACE and Traditional Groups, Percentile Ranks Corresponding to Adjusted Achievement Means: Cedarburg High School

	Comparison of P and T Groups	Comparison of Successive Classes						Adjusted Means and Equivalent Percentile Ranks							
		1977-78 vs 1978-79	1977-78 vs 1979-80	1977-78 vs 1980-81	1978-79 vs 1979-80	1978-79 vs 1980-81	1979-80 vs 1980-81	1977-78	%ile	1978-79	%ile	1979-80	%ile	1980-81	%ile
Grade 9															
Reading	P+														
P+		NS	NS	NS	NS	NS	NS	15.43	73	14.92	70	14.66	68	15.85	75
T		NS	NS	NS	NS	NS	NS	13.50	61	13.91	63	13.74	62	14.05	65
Language	P+														
P+		NS	NS	NS	NS	NS	NS	15.86	69	16.51	74	15.82	69	16.36	73
T		S+	S+	NS	NS	NS	NS	13.30	52	14.76	62	14.48	61	14.06	59
Math	P+														
P+		NS	NS	NS	NS	NS	NS	14.19	73	14.58	74	14.02	72	14.92	76
T		NS	NS	NS	NS	NS	NS	13.08	61	12.91	59	12.73	58	13.13	61
Average Student N															
P	100														
T	161														
Grade 10 (1978-79, 1979-80, 1980-81)															
Reading	P+														
P+					NS	NS	NS			17.56	71	16.94	68	17.56	71
T					NS	NS	NS			15.28	61	15.55	62	15.52	62
Language	P+														
P+					NS	NS	NS			17.69	69	18.32	75	18.52	76
T					NS	NS	NS			15.19	53	16.18	60	16.04	59
Math	P+														
P+					NS	S-	S-			17.45	75	17.45	75	15.99	70
T					NS	NS	NS			14.99	66	14.71	65	14.52	64
Average Student N															
P	96														
T	159														

P+ The mean of the PACE group was significantly higher than the mean of the traditional group.
S+ The mean of the class of the later year was significantly higher than the mean of the class of the earlier year.
S- The mean of the class of the later year was significantly lower than the mean of the class of the earlier year.

Table 8. (Continued):

	Comparison of P and T Groups	Comparison of Successive Classes: 1977-78 vs 1978-79	1977-78 vs 1979-80	1977-78 vs 1980-81	1978-79 vs 1979-80	1978-79 vs 1980-81	1979-80 vs 1980-81	Adjusted Means and Equivalent Percentile Ranks: 1977-78	%ile	1978-79	%ile	1979-80	%ile	1980-81	%ile
Grade 11 (1979-80, 1980-81)															
Reading	P+														
P+							NS					18.13	62	18.79	64
T							S+					15.51	49	17.46	58
Language	P+														
P+							S+					17.56	56	19.30	70
T							S+					14.53	35	17.84	58
Math	P+														
P+							NS					18.17	67	18.95	70
T							S+					14.91	55	16.06	59
Average Student N															
P	83														
T	146														

P+ The mean of the PACE group was significantly higher than the mean of the traditional group.
S+ The mean of the class of the later year was significantly higher than the mean of the class of the earlier year.
S- The mean of the class of the later year was significantly lower than the mean of the class of the earlier year.

rank equivalent to each adjusted mean are indicated. The results that follow are based on the comparison of the significance of the differences among the adjusted means.

The results for Grade 9 reflect what the students had learned through Grade 8 since the tests were administered early in the school year. The results are included here to indicate the extent to which the PACE students already were achieving higher than the traditional students when they entered Grade 9. The adjusted mean of the four Grade 9 PACE groups based on the average of the four years was significantly higher than the mean of the four traditional groups in reading, language, and mathematics. No mean for any later Grade 9 PACE group was significantly different from 1977-78; the mean arithmetic achievement of the 1978-79 and 1979-80 traditional groups was significantly higher than the mean of the 1977-78 traditional group.

We should note that the percentile ranks of the four Grade 9 PACE groups were considerably higher than those of the Grade 9 traditional students, for example, 73 in reading, 69 in language, and 73 in mathematics for the PACE group of 1977-78 and 61, 52, and 61, respectively, for the traditional group of 1977-78. Accordingly, there was less possibility for the PACE students to gain between the Grade 9 and Grade 10 testing. But more important, they were ready for higher level content but, as noted before, the curricular arrangements of the PACE program did not permit this.

The adjusted means in reading, language, and mathematics based on the average of three years of the PACE Grade 10 groups were significantly higher than those of the Grade 10 traditional groups in all three areas. The adjusted means in reading, language, and mathematics of the successive

traditional Grade 10 groups were not significantly different from one year to the next. The adjusted means of the successive Grade 10 PACE groups were not significantly different from one year to the next except that the mean of the Grade 10 group of 1980-81 in mathematics was significantly lower than the mean of either prior Grade 10 group. Despite this, the mean of the PACE group was still substantially higher in mathematics than the mean of the traditional group.

The adjusted means of the two successive Grade 11 PACE groups, based on an average of two years, were significantly higher than the means of the traditional groups in reading, language, and mathematics. The adjusted mean of the Grade 11 PACE group of 1980-81 was significantly higher than in 1979-80 in language and not significantly different in reading and mathematics. The adjusted means of the Grade 11 traditional group of 1980-81 were significantly higher than in 1979-80 in all three subjects.

Table 9 presents a summary of findings regarding the mean achievements and the mean gains made from Grade 9 to Grade 10 to Grade 11 to Grade 12 by the PACE and traditional students of Cohort 1 and from Grade 9 to Grade 10 to Grade 11 by the students of Cohort 2. The adjusted means of the PACE students of Cohort 1, averaged across Grades 9 to 12, were significantly higher than those of the traditional students in reading, language, and mathematics. The adjusted means of the PACE students of Cohort 2 also were significantly higher than those of the traditional students in language and mathematics but not in reading.

Table 9. Summary of Findings Regarding Mean Gain and Mean Achievement for Two Successive PACE Longitudinal Cohorts and Two Successive Traditional Longitudinal Cohorts: Cedarburg High School

	Comparison of Mean Gain by Each Cohort							Comparison of Mean Achievement of PACE and Traditional	
	Cohort 1				Cohort 2				
	Gr. 9 1977-78	Gr. 10 1978-79	Gr. 11 1979-80	Gr. 12 1980-81	Gr. 9 1978-79	Gr. 10 1979-80	Gr. 11 1980-81	Cohort 1	Cohort 2
Reading									
PACE	15.62	17.49	18.61	19.79[1]	14.15	16.03	18.67[4,5]	S+	NS
TRAD	13.37	15.39	15.70	16.93[1]	14.11	15.82	17.75[4]		
Diff.	2.25	2.10	2.91	2.86	0.04	0.21	0.92		
Language									
PACE	15.82	17.72	18.21	19.41[1]	15.85	17.60	19.59[4]	S+	S+
TRAD	13.19	15.18	15.54	16.01[3]	14.95	16.48	18.45[4]		
Diff.	2.63	2.54	2.67	3.40	0.90	1.12	1.14		
Math									
PACE	13.85	17.34	18.66[5]	19.16[2]	14.03	16.56	18.99[4]	S+	S+
TRAD	12.76	14.98	15.11	16.24[2]	12.93	14.96	16.61[4]		
Diff.	1.09	2.36	3.55	2.92	1.10	1.60	2.38		
Student N									
P	61				87				
T	122				130				

S+ The mean of the PACE group was significantly higher than the mean of the traditional group.
1 The gains for each comparison except Grade 10 to Grade 11 were statistically significant.
2 The gains for each comparison involving Grade 9 were statistically significant; the gain from Grade 10 to Grade 12 was statistically significant.
3 The gains for each comparison involving Grade 9 were statistically significant.
4 The gains for each comparison were statistically significant.
5 The gain of the PACE group from Grade 9 to Grade 11 was significantly greater than the gain of the traditional group from Grade 9 to Grade 11.

Note: There were no statistically significant pair-wise gain by quarter interactions.

Turning to the gains of Cohort 2 first, which are very consistent, we observe that both the PACE cohort and the traditional cohort gained significantly from Grade 9 to Grade 10 to Grade 11 in reading, language, and mathematics. The gains of the PACE and traditional students of Cohort 1 are not so consistent inasmuch as neither group gained significantly in any area from Grade 9 to 10 to 11 to 12. In reading, the PACE and traditional students of Cohort 2 made a significant gain from one grade to the next, except from Grade 10 to 11. In mathematics, both groups gained significantly from Grade 9 to Grade 10 and from Grade 10 to Grade 12 but not from Grade 10 to Grade 11 or Grade 11 to Grade 12. In language, the PACE students gained significantly from one grade to the next, except from Grade 10 to 11, whereas the traditional students gained significantly from Grade 9 to 10 but not from Grade 10 to 11 or Grade 11 to 12. The gain of the PACE students of Cohort 1 in mathematics was significantly greater than that of the traditional student from Grade 9 to 11, and the gain of the PACE students of Cohort 2 was significantly greater than that of the traditional students from Grade 9 to 11 in reading. The traditional students did not gain more than the PACE students in any area.

Earlier it was indicated that the adjusted means of the two PACE cohorts, based on the average achievements across four and three years, respectively, were significantly higher than the means of the two traditional cohorts in reading, language, and mathematics. It is interesting to compare the size of the observed differences between the PACE and traditional students of Cohorts 1 and 2 from Grade 9 to Grade 12 and Grade 9

to Grade 11, respectively. The differences between the observed means of the PACE and traditional students of Cohort 1 were greater in Grade 12 than in Grade 9 in reading, language, and mathematics, while for Cohort 2 they were also greater in Grade 11 than in Grade 9 in all three subjects. Accordingly, the differences in achievement in relation to ability favoring PACE cohorts increased from Grade 9 to Grade 12 and from Grade 9 to 11, respectively.

The relationship of the implementation of the WRISE improvement strategy and processes by the PACE staff to the changes in student achievement is not summarized. It should be recalled that the WRISE improvement strategy was implemented only in the PACE program and that the four-teacher academic team involved in providing the instruction in English, mathematics, science, and social studies to Grade 9 PACE students was implementing some educational practices in accord with WRISE concepts and practices in 1977-78. However, they did not start using the results of their testing program in setting achievement goals for individual students and groups of students until 1979-80. A serious constraint was placed on securing high PACE student achievement by a school board ruling which provided that the same curriculum and textbooks were to be used by both the PACE and traditional students in the required academic subjects. In addition, the assistant principal responsible for planning and coordinating the PACE program resigned in 1978-79 and the extension of the PACE program into Grade 11 in 1979-80 became the responsibility of the assistant coordinator. She attempted to support the Grade 9 and Grade 10 teams while also working on curriculum, staffing, and advising concerns of Grade 11 in 1979-80 and subsequently Grade 12 in 1980-81. The principal

of the school resigned in 1979-80. Accordingly, the WRISE improvement strategy was not fully implemented in Grades 9 and 10 and it was implemented with only part of the continuing PACE students in Grades 11 and 12 in English and math.

The preceding partial implementation of the WRISE processes and strategies in the PACE program was accompanied with high student achievement in reading, language, and mathematics. The curriculum constraints on the PACE students in Grades 9 and 10, the higher entering achievement level of the Grade 9 PACE students, and the inability to extend the PACE program into Grades 11 and 12 as well as initially planned probably contributed to the PACE students not having achieved even higher in comparison with the traditional students.

Hood River Valley High School. Table 10 gives a summary of the findings regarding the mean achievement of four successive Grade 10, 11, and 12 groups of students at Hood River Valley High School on whom mental ability scores were available. Differences among the adjusted means that were significant at or above the .05 level are indicated. The adjusted means for each group and the national percentile rank for each adjusted mean are indicated. The achievement information is based on the administration of the Stanford Test of Academic Skills administered in May of each of the four years. The mental ability information is based on the results of the General Aptitude Test Battery that was administered when the students were in Grade 9 of the two local junior high schools. Analysis of covariance was used in determining the significance of the differences among the successive groups. The results that follow are based on the percentile ranks for 1977-78 and 1980-81 and on the comparison of the significance of the differences among the adjusted means of the successive groups of students.

The mean percentile ranks of the Grade 10 students in reading were 80 in 1980-81 and 74 in 1977-78. The mean percentile rank of the Grade 10 students in English in 1980-81 was 60, while in 1977-78 it was 46. The percentile rank in math for 1980-81 was 62 and in 1977-78 it was 54. The adjusted means of the Grade 10 students of 1980-81 in comparison with those of 1977-78 were significantly higher in reading, English, and math.

Table 10. Summary of Findings Regarding Mean Achievement of Four Successive Grade 10, Grade 11, and Grade 12 Groups, Percentile Ranks Corresponding to Adjusted Means, and Mental Ability Percentile Rank: Hood River Valley High School

	Comparisons of Successive Groups					
	1978-79 vs 1977-78	1979-80 vs 1977-78	1980-81 vs 1977-78	1979-80 vs 1978-79	1980-81 vs 1978-79	1980-81 vs 1979-80
Grade 10						
Reading	NS	S+	S+	S+	NS	NS
English	NS	S+	S+	S+	NS	NS
Math	NS	S+	S+	S+	NS	NS
Grade 11						
Reading	NS	NS	S+	NS	S+	S+
English	NS	NS	S+	NS	NS	S+
Math	NS	NS	S+	NS	S+	S+
Grade 12						
Reading	NS	NS	NS	NS	NS	NS
English	NS	NS	NS	NS	NS	NS
Math	NS	NS	NS	NS	NS	NS

	Adjusted Means and Equivalent Percentile Ranks							
	1977-78		1978-79		1979-80		1980-81	
	$\bar{X}$	%ile	$\bar{X}$	%ile	$\bar{X}$	%ile	$\bar{X}$	%ile
Grade 10								
Reading	47.85	74	46.20	70	53.66	81	52.85	80
English	43.04	46	41.56	43	47.74	56	49.14	60
Math	25.99	54	24.50	49	29.43	64	28.91	62
Average Student N		195		160		173		132
Grade 11								
Reading	54.10	54	55.42	59	52.81	52	58.55	65
English	47.32	45	48.64	48	46.67	43	51.40	55
Math	29.49	56	30.18	58	30.00	58	32.88	66
Average Student N		151		169		113		156
Grade 12								
Reading	56.34	53	59.03	58	58.81	58	56.73	54
English	49.05	42	51.34	47	51.85	48	50.58	45
Math	30.64	53	32.39	59	32.00	58	31.66	56
Average Student N		116		137		145		110

S+ The mean of the group of the later year was significantly higher than the mean of the group of the earlier year.

The mean percentile ranks for the Grade 11 students in 1980-81 in comparison with 1977-78 were 65 and 54 in reading, 55 and 45 in English, and 66 and 56 in mathematics. The adjusted means of the Grade 11 group of 1980-81 were significantly higher than the means of the 1977-78 group in all three areas.

The mean percentile ranks of the Grade 12 students in 1980-81 in comparison with 1977-78 were 54 and 53 in reading, 45 and 42 in English, and 56 and 53 in mathematics. The adjusted means of the successive Grade 12 groups were not significantly different for any two years.

The significantly higher mean achievements as well as the higher percentile ranks of the Grade 10 and Grade 11 groups are accounted for in terms of the Hood River Valley staff implementing the recommended improvement strategy with increasing effectiveness, particularly during the last two years. In the last two years concrete goals were set to raise the achievement level in each subject field and related planned changes to achieve each goal were implemented, including requiring a new course in English of all Grade 10 students starting in 1979-80. The mean achievements of the students of Grade 10 and 11 might have been higher had it not been for a teacher strike that occurred in 1978-79 and many changes in the teaching staff, especially from 1977-78 to 1978-79.

The adjusted means of the Grade 12 groups were not significantly higher in any of these subject areas from year to year. The lack of significantly higher Grade 12 mean achievement cannot be accounted for

in terms of the planned changes that were made in the last two years in accordance with the recommended improvement strategy. It should be pointed out that, contrary to the national pattern of the 1970's, a continuing decline among the successive Grade 12 classes did not occur.

Table 11 presents a summary of findings regarding the mean gains made from Grade 10 to Grade 11 to Grade 12 by each of the two longitudinal cohorts, and the comparisons of the adjusted means of the two cohorts based on the average of their scores when in Grades 10, 11, and 12. The students of Cohorts 1 and 2 gained significantly in reading from each grade to the next and the students of Cohort 2 gained significantly in English from Grade 10 to Grade 11 to Grade 12. The students of Cohorts 1 and 2 gained significantly in mathematics from Grade 10 to 11 and Grade 10 to 12 but not from Grade 11 to 12. Cohort 1 gained significantly in English from Grade 10 to 11 and Grade 10 to 12 but not from Grade 11 to Grade 12. Related to the mean achievement of the two cohorts across the three grades, Cohort 1 achieved significantly higher than Cohort 2 in reading. The differences between the two cohorts were not significant in English and math.

We should recognize that all the students of the longitudinal cohorts are part of the successive Grade 10, 11, and 12 groups, but that some students of the successive Grade 10, 11, and 12 classes missed one or more tests and are not included in the longitudinal groups. Accordingly, the results based on the analysis of the achievements of the successive classes and on the longitudinal cohorts are not directly comparable. For example, we see that the longitudinal groups gained

Table 11. Summary of Findings Regarding Mean Gain and Mean Achievement of Two Successive Longitudinal Cohorts: Hood River Valley High School

	Comparison of Mean Gain Made by Each Cohort						Quarter Making Greater Gain						Cohort with Higher Average Achievement
	Cohort 1			Cohort 2			Gr.10-11		Gr.11-12		Gr.10-12		
	$\bar{X}$ Gr. 10	$\bar{X}$ Gr. 11	$\bar{X}$ Gr. 12	$\bar{X}$ Gr. 10	$\bar{X}$ Gr. 11	$\bar{X}$ Gr. 12	Coh. 1	Coh. 2	Coh. 1	Coh. 2	Coh. 1	Coh. 2	
Reading	52.65	57.19	58.99[1]	51.33	54.90	58.33[1]	Q1>Q2	NS	NS	NS	Q1>Q2	NS	Coh. 1
English	47.26	51.07	51.54[2]	47.34	49.13	51.98[1]	NS	NS	NS	NS	NS	NS	NS
Math	29.13	31.91	32.21[2]	29.22	32.24	33.01[2]	NS	NS	NS	NS	NS	NS	NS
Student N	134			100									

[1]The gains from Grade 10 to 11, Grade 11 to 12, and Grade 10 to 12 were statistically significant.

[2]The gains from Grade 10 to 11 and Grade 10 to 12 were statistically significant.

from Grade 11 to Grade 12 in certain areas whereas the analysis of the successive Grade 12 classes showed no significantly higher means for the later Grade 12 classes of 1979-80 and 1980-81 in any subject field.

Only one significant difference was found in the gains made by the quarters of each cohort in mental ability; the lowest quarter of Cohort 1 gained significantly more in reading from Grade 10 to Grade 11 than did the second quarter. This pattern of gains reflects the attention given by the teaching staff to the lowest one-quarter of the class. Goals were set in the last two years to bring each quarter up to its mean mental ability level. Moreover, the lowest achievers in reading when entering Hood River Valley were assigned to units of instruction in reading.

The relationship of the implementation of the WRISE improvement strategy and processes by the Hood River Valley staff to the changes in student achievement is now summarized. The information provided by Hood River Valley to the project indicated that the majority of the staff involved in providing the instruction in reading, English, and mathematics were already implementing many educational practices in accord with WRISE concepts and practices in 1977-78. However, they used the results of their testing program of 1977-78 and 1978-79 to set concrete achievement goals for individual students and groups of students in 1979-80 and 1980-81 in accord with the recommended improvement strategy. The improvement activities to achieve the goals were planned and implemented by the Hood River Valley staff with very

little consultation or assistance from the project.

Regarding changes in student achievement, from 1977-78 through 1980-81, 14 of the 24 adjusted means of the Grade 10 and Grade 11 groups of 1979-80 and 1980-81 in reading, English, and mathematics were significantly higher than the adjusted means of the earlier groups of 1977-78 and 1978-79, 10 were not significantly different, and none were significantly lower. None of the adjusted means of the successive Grade 12 groups were significantly different. The students of both longitudinal cohorts gained significantly from Grade 10 to Grade 11 to Grade 12 in reading and Cohort 2 gained significantly from one grade to the next in English. The students of Cohorts 1 and 2 gained significantly from Grade 10 to 11 and from Grade 10 to 12, but not from Grade 11 to Grade 12 in mathematics. The students of Cohort 1 gained significantly in English from Grades 10 to 11 and Grade 10 to Grade 12, but not from Grade 11 to Grade 12.

Based on the student outcomes and the improvement activities, we conclude that the use of the WRISE design, processes, and strategies by the Hood River Valley High School staff was accompanied with significantly higher student achievement in reading, English, and mathematics in Grades 10 and 11 and with maintaining a stable level of achievement by the Grade 12 students. Unanticipated events, including a teacher strike and many changes in the staff in 1978-79, probably contributed to lack of even higher achievement. These and other unanticipated events, as well as the many planned changes in the curriculum and the advising and instructional practices that occurred each year, are included in the detailed report of the cooperative research with Hood River Valley High School.

Summary of the Summative Evaluation in Local School Settings

Purposes

The main aim of the summative evaluation in local schools was to ascertain the usability and effectiveness of the WRISE improvement concepts, processes, and materials. The most important objectives were to ascertain:

1. improvement leaders' perceptions of the usability and effectiveness of the WRISE improvement process.
2. staff members' evaluations of the quality, usability, and effectiveness of the materials.
3. teachers' perceptions of the extent to which the WRISE comprehensive and enabling objectives indicate desirable directions for the improvement of secondary education.

Participating Schools

The following schools participated in the summative evaluation:

A. Steuben Middle School, Milwaukee, Wisconsin
B. Webster Transitional School, Cedarburg, Wisconsin
C. Thompson Junior High School, Middletown, New Jersey
D. Beckman High School, Ogersville, Iowa
E. Bishop Gallagher High School; Harper Woods, Michigan
F. Cedarburg High School, Cedarburg, Wisconsin
G. Hood River Valley High School, Hood River, Oregon
H. Middletown High School--South, Middletown, New Jersey
I. Stevens Point Area Senior High School, Stevens Point, Wisconsin
J. Howard County Public Schools, Ellicott City, Maryland

These schools were part of a network of secondary schools associated with the Wisconsin Center for Education Research. They were selected from the larger network population on the basis of the local school leader's expressed interest in the program, participation in a workshop for improvement leaders, and willingness to enter into an agreement with the Wisconsin Center and to carry out the provisions of the agreement.

The main provisions of the agreement were that the local school would:

1. use the WRISE processes and materials related to one or more WRISE components for the purpose of gaining information, planning, or carrying out an improvement effort related to one or more of the WRISE components.

2. complete the information-gathering forms and mail them to the project.

3. provide additional descriptive information that might be needed by the project in interpreting the results and preparing the report of the summative evaluation.

Results

In this summary of results, only one of several tables from the final report is reproduced. It is included here to illustrate the kind of items used in the questionnaires.

Nine of the 10 leaders responded to the 34-item evaluation form designed to get their reactions regarding the importance, usability, and effectiveness of the WRISE processes and strategies. These processes and

strategies are explained in the Improvement Leader's Manual. Each item of the evaluation form was to be checked very high, high, average, low, or very low. A very high was assigned a value of 5, high 4, average 3, low 2, and very low 1. A summary of the ratings is given in Table 12.

Let us consider the results pertaining to each main part of the evaluation. The kinds of knowledge, training, and experience recommended for the improvement leader were generally regarded as of high or very high importance by these local school leaders. Having had experience in leading a local effort such as a Title I or Title IVc project received the lowest mean rating (4.00). This item was rated low by the leaders of the two private schools. We should note that these and the other relatively low ratings of these two leaders were for items that were not particularly relevant to private schools.

The usability of the general plan for leading the school's improvement effort and its effectiveness in terms of aiding the staff start an improvement effort were usually rated high or very high, except for the items dealing with the identification of district and state support. The leaders of the private schools rated these items relatively low.

The usability of the six-step improvement process in terms of the time and effort required for using it and the effectiveness of the process in terms of aiding the staff to achieve its educational improvement goals were regarded as high to very high.

Table 12

Local School Leaders' Evaluation of WRISE Improvement Processes

SCHOOL	A	B	C	D	E	F	G	I	J	$\bar{X}$
Importance of the improvement leader having the following knowledge, training, and experience:										
1. The leader has had experience as a middle, junior high, or senior high school teacher, counselor, or administrator.	5	5	5	5	5	4	4	5	5	4.78
2. The leader has had experience in leading a local effort (such as a Title I or Title IVc Project) and is strongly committed to leading an improvement effort.	5	5	3	2	2	5	5	5	4	4.00
3. The leader has participated in a workshop designed specifically for leaders of this educational improvement program.	5	5	5	5	3	3	5	5	4	4.44
4. The leader has studied the textbook, the 10 filmstrips, and the 9 audiocassettes of the Wisconsin Program and can explain the concepts and practices included in them.	5	5	5	4	4	3	5	5	5	4.56
5. The leader has studied the Learning Guide for the Wisconsin Program for the Renewal and Improvement of Secondary Education: School Staff Members and can use it in leading the school's educational improvement effort.	4	5	5	4	4	4	4	5	4	4.33
6. The leader has determined his or her level of expertise related to each objective of the Design for the Renewal and Improvement of Secondary Education and has identified any objectives for which he or she will require expert assistance from within or outside the school to lead an improvement activity.	5	4	5	3	5	5	4	5	4	4.44
Usability of the following general plan for leading your school's educational improvement activities in terms of the time and effort required for using it.										
7. Establish a need for educational improvement.	5	5	5	5	5	5	5	5	4	4.89
8. Emphasize the importance of continuing educational improvement.	5	4	5	4	3	4	5	5	5	4.44
9. Clarify staff roles and responsibilities related to the improvement activities.	5	5	4	4	4	4	5	5	5	4.56
10. Arrange incentives to promote the continuing involvement of the staff in improvement activities.	5	5	5	4	3	4	4	5	3	4.22
11. Provide organizational and administrative mechanisms to involve the staff in planning, monitoring, and evaluating the improvement activities.	5	4	5	4	5	5	5	5	5	4.78
12. Assure that time, space, and other physical arrangements are provided for the staff to plan and evaluate their improvement activities.	5	4	5	4	4	4	4	5	4	4.33
13. Identify district and state support for the improvement activities.	4	4	1	3	3	3	4	5	4	3.44

(Continued)

Table 12. cont.

Local School Leaders' Evaluation of WRISE Improvement Processes, cont.

SCHOOL	A	B	C	D	E	F	G	I	J	$\bar{X}$
Effectiveness of the general plan in terms of aiding the staff start an improvement effort.										
14. Establish a need for educational improvement.	4	5	5	5	5	5	4	5	5	4.78
15. Emphasize the importance of continuing educational improvement.	3	5	5	4	4	3	4	5	5	4.22
16. Clarify staff roles and responsibilities related to the improvement activities.	3	5	4	4	5	5	4	5	4	4.33
17. Arrange incentives to promote the continuing involvement of the staff in improvement activities.	3	5	5	4	3	4	4	5	4	4.11
18. Provide organizational and administrative mechanisms to involve the staff in planning, monitoring, and evaluating the improvement activities.	3	5	5	4	4	4	5	5	4	4.33
19. Assure that time, space, and other physical arrangements are provided for the staff to plan and evaluate their improvement activities.	3	4	5	4	3	4	4	5	4	4.00
20. Identify district and state support for the improvement activities.	3	4	4	3	2	3	4	5	5	3.67
Usability of the six-step improvement process in terms of the time and effort required for using it.										
21. Assess your school's situation.	4	5	5	5	3	4	5	5	5	4.56
22. Develop your school's improvement plan.	4	5	5	4	4	4	5	5	4	4.44
23. Carry out the staff's information-gaining activities.	4	4	4	4	3	5	4	5	4	4.11
24. Carry out the staff's preparatory activities.	4	5	5	4	5	4	4	5	4	4.44
25. Carry out the implementation activities.	4	5	5	4	4	4	5	5	4	4.44
26. Carry out the evaluation activities.	4	4	4	4	5	4	4	5	4	4.22
27. The preceding 6 steps as a total process.	4	5	4	4	4	4	5	5	5	4.44
Effectiveness of the six-step improvement process in terms of aiding your staff achieve its educational improvement goals.										
28. Assess your school's situation.	3	5	5	4	2	4	5	5	4	4.11
29. Develop your school's improvement plan.	3	5	5	3	4	5	5	5	4	4.33
30. Carry out the staff's information-gaining activities.	3	4	5	3	3	4	4	5	4	3.89
31. Carry out the staff's preparatory activities.	4	4	5	3	4	4	4	5	4	4.11
32. Carry out the start-up activities.	4	5	5	3	5	4	5	5	4	4.44
33. Carry out the evaluation activities.	4	4	4	3	5	5	4	5	4	4.22
34. The preceding 6 steps as a total process.	3	5	5	3	4	4	5	5	5	4.33

From one to 18 staff members of each participating school responded to a staff questionnaire, the median number being seven. The large majority of the respondents were members of the school's educational improvement committee. Their ratings of the usability and effectiveness of the materials and the value of the materials in terms of presenting current and important information were generally high.

Thirty-five teachers rated the WRISE comprehensive and enabling objectives in terms of whether implementing them would have a highly desirable effect, desirable, somewhat desirable, somewhat undesirable, undesirable, or highly undesirable effect on secondary education. Many of the mean ratings were 5.50 or higher and the lowest was 4.30. Items dealing with giving students increasing initiative for making decisions, accepting the responsibility for the decisions, and for evaluating their decisions were generally rated lower than were other objectives.

The three main conclusions from the summative evaluation were indicated in the final report of the summative evaluation as follows:

1. Secondary school principals perceive the usability and effectiveness of the WRISE improvement process as high to very high.

2. Local school staff members regard the usability and effectiveness of the WRISE materials as high.

3. Teachers perceive the WRISE comprehensive and enabling objectives as indicating desirable directions for the improvement of secondary education.

It will be recalled that this summative evaluation was conducted without providing any on-site consultation or technical support to the participating local schools. The amount of telephone consultation and correspondence by mail was relatively meager. How may this lack of support have been related to the activities of the schools?

In two middle schools and a high school where most of the WRISE concepts and processes were already being practiced, gaining information from the WRISE materials was followed during the year with planning and implementation of improvement activities by individual staff members, by teams or other small groups of teachers, or by both. At the other sites where fewer WRISE concepts and principles were being implemented at the beginning of 1980-81, the materials were used to gain information either as a beginning point for determining one or more areas of improvement or to start to plan one or more areas of improvement.

Summary of the Summative Evaluation in Universities

Purpose

It is possible that the time between knowledge of effective practices and implementation of them can be reduced if educators become informed of the practices as part of their university education. Accordingly, the WRISE materials were designed for use in university courses as well as by local school staffs. The main aim of the evaluation was to ascertain the kinds of university courses in which part or all of the WRISE material could be used and to determine how well the material aided the professors to achieve their course objectives. The more specific objectives were to determine:

1. how well the university students learned the WRISE concepts and practices from their study of the materials.

2. whether conditions such as the length of the course and the amount of material assigned were associated with student gains.

3. the students' judgments of the quality and other attributes of each set of correlated material, i.e., textbook chapter, filmstrip, school-experiences audiocassette, learning guide chapter.

4. the professors' evaluations of the quality, usability, effectiveness, and other attributes of the material.

5. the professors' perceptions of the extent to which the WRISE comprehensive objectives indicate desirable directions for secondary education and are usable by local schools in identifying areas of improvement.

Participating Universities

The name of the university and the title of the course and its characteristics follow. Nine universities participated in the summative evaluation.

A. Southwest Texas State University, "The Secondary Curriculum," 3-credit, elective, graduate course.

B. University of Cincinnati, "Supervision of Instruction," 3 quarter hours of credit, graduate course, required in the certification program for educational leaders.

C. University of Toledo, "Secondary Teaching and Learning, II," 4-12 hours of credit, undergraduate, required in the teacher certification program.

D. University of Wisconsin--LaCrosse, "Curriculum of the Secondary School," 3-credit, graduate course, not required for certification.

E. University of Wisconsin--Platteville, "Secondary Education," 2-credit, undergraduate, not required for teacher certification.

F. University of Wisconsin--Stevens Point, "Instructional Programming," 3-credit, graduate course, not required for certification.

G. University of Wisconsin--Eau Claire, used on an individual basis with students enrolled in various courses.

H. University of Wisconsin--Eau Claire, 3-credit, elective, graduate course.

I. University of Wisconsin--Madison, "The School Principalship," 3-credit, graduate course.

The universities were selected on the basis of their expressed interest in the program, their willingness to participate in a workshop, and their willingness to enter into an agreement with the Wisconsin Center for Education Research to carry out the provisions of the agreement. The provisions of the agreement were similar to those indicated earlier for the local schools.

The professors used from relatively small amounts of the material to the entire set of materials in their courses. Seven of the professors offered their courses during the academic year, while two of them offered special short courses in the summer of 1981. In the two summer courses and in a graduate course where the materials were used in independent study, the pretests and posttests were not administered.

Results

Table 13 presents a summary of the pretest→posttest results. We observe that the students made a statistically significant gain from the pretest to the posttest at five of the six universities. Of the three courses in which the percent correct on the posttest was the lowest, two were undergraduate, one of which carried only two credits. The other was a 10-week graduate course. The professor indicated he had difficulty in finding time to use the WRISE materials and still complete the other requirements of this course. The students achieved considerably higher in the three graduate courses where a considerable amount of the WRISE materials were used.

We now turn to findings based on questionnaires. Due to space constraints, the tables are not provided in which the responses are summarized.

Table 13

Summary of Pretest--Posttest Results

University	Course Description	Correlated Materials Used	No. of Students Who Took Pretests and Posttests	Total No. of Items	Pretest	Posttest	% Correct
Southwest Texas State University	3-credit, Sem. The Secondary Curriculum Graduate	Textbook Chs. 1-10 Filmstrips 1-10 Audiocassettes 2-9 Learning Guide chs optional	15	110	$\bar{X}$ 56.30 SD 8.63	74.00* 14.67	76
University of Cincinnati	3-credit, Qtr. Undergrad., Admin. in Education Grad, Supervision of Instruction	Textbook Chs. 1, 4, 8 Filmstrips 1, 4, 8	19	35	$\bar{X}$ 18.42 SD 2.71	18.42 4.30	53
University of Toledo	4-12 credit, Sem. Secondary Teaching & Learning Undergrad	Textbook Chs. 2, 3 Filmstrips 2, 3 Audiocassettes 2, 3	31	27	$\bar{X}$ 14.81 SD 2.93	16.10* 3.66	60
Univ. of Wisconsin--LaCrosse	3-credit, Sem. Secondary School Curriculum, Grad.	Textbook Chs. 1, 2, 3, 4 Filmstrips 1, 2, 3, 4	8	50	$\bar{X}$ 27.78 SD 3.96	34.78* 5.24	70
Univ. of Wisconsin--Platteville	2-credit, Sem. Secondary Education, Undergrad.	Textbook Chs. 1-4, 8, 10 Filmstrips, 1, 2, 3 Audiocassette 2 Learning Guide Ch. 2	9 (2, 3, 4, 10)	52	$\bar{X}$ 29.11 SD 4.40	32.89* 4.08	63
Univ. of Wisconsin--Stevens Point	3-credit, Sem. Instructional Programming Graduate	Textbook Chs. 1, 2, 3, 7, 9, 10 Filmstrips 1, 2, 3, 7, 9, 10 Audiocassettes 2, 3, 7, 9, 10 Learning Guide Chs. 1, 2, 3, 7, 9, 10	13	73	$\bar{X}$ 42.00 SD 4.81	70.08* 2.63	96

* Statistically significant $p \leq$

The mean ratings of the students and the professors regarding properties of the WRISE materials were generally between average and high. The professors' evaluations of the desirability and usability of the WRISE comprehensive objectives were uniformly high to very high.

The conclusions based on all of the information gathered in the summative evaluation in the universities may be stated as follows:

1. University students learned the WRISE concepts and practices from their study of the material. The amount of gain is related to whether the course is graduate or undergraduate, the amount of WRISE material used in the course, the time given to the use of the WRISE material in the course, and the instructional approach employed by the professor.

2. The effectiveness of the textbook and the filmstrips in helping the students become aware of a variety of concepts and practices was perceived to be high by the students, as was also the value or importance of the ideas and practices presented in the material. The technical quality of the material was also regarded as high. The properties of the school-experiences audiocassettes and the learning guide chapters were regarded as above average but not as high as the textbook and the filmstrips.

3. The professors regarded the usability, effectiveness, and technical quality of the textbook, filmstrips, audiocassettes, learning guide, and the complete set of materials as high to very high. The college instructor's guide was regarded as above average but lower than the other materials.

4. The professors perceived the WRISE comprehensive objectives as indicating highly desirable directions for improving secondary education and highly usable by local schools in identifying areas of educational improvement.

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