DOCUMENT RESUME

ED 381 140 IR 017 062

AUTHOR	Hecht, Jeffrey B.; And Others
TITLE	Project Homeroom, Project Schoolroom, and Regular School: Innovations in Team Teaching, Interdisciplinary Learning, and the Use of Technology. A Final Report on the Project at the Maine East High School.
INSTITUTION	Illinois State Univ., Normal. Technological Innovations in Educational Research Lab.
PUB DATE	13 Sep 94
NOTE	34p.
PUB TYPE	Reports - Research/Technical (143)
EDRS PRICE	MF01/PC02 Plus Postage.
DESCRIPTORS	*Computer Uses in Education; Cooperative Planning; *Curriculum Development; *Educational Innovation; Educational Technology; Grade 9; High Schools; Interdisciplinary Approach; *Teaching Methods; *Team Teaching
IDENTIFIERS	Maine Township High Schools IL

ABSTRACT

The students, faculty, and administration at the Maine Township East High School engaged in an ongoing curricular innovation program during the 1993-94 academic year, investigating the notions of teacher teaming, interdisciplinary instruction, and the use of computer technology in the delivery of a core education in biology, world cultures, English, and algebra. The freshman class was divided into the following three groups, each emphasizing certain of the innovations under study: (1) Project Homeroom teachers worked together as a team, planning lessons together and working to incorporate computers into their classes. Students were given computers to use in their homes for the duration of the project and were able to use computer software for assignments and link with their teachers using electronic communications tools. (2) Project Schoolroom teachers also worked in teams, but did not have the same access to computer technology. Teacher teaming, getting to know the students better, and an interdisciplinary approach were the main features of this group. (3) Regular School teachers and students served as the control group, with the students receiving traditional instruction from teachers following their usual lesson plans. This project summary evaluation report represents information gathered from two written surveys of all participating students, interviews with teachers in each of the experimental groups, and an evaluation of selected exemplary curricular products, including student projects. In addition, student grades in each of the four courses under study, cumulative grade point averages, attendance records, student performance on criterion referenced examinations and student demographies were examined. Major findings include: (1) demographic and prior achievement levels of students in the Project Homeroom, Project Schoolroom, and Regular School varied little; (2) students in the Project Schoolroom group tended to achieve statistically significantly higher grades than the students in the other groups in each of the four subject areas considered; (3) Project Schoolroom students tended to be absent less than their counterparts; (4) teacher teaming provided direct benefits to both teachers and students; and (5) participating teachers found it difficult to integrate computer technology, and plan long-term interdisciplinary units, into the curriculum given the current constraints of standard curriculum and Criterion Referenced Test (CRT) assessment. Results are illustrated in 13 figures. (Contains 22 references.) (MAS)

Project Homeroom, Project Schoolroom, and Regular School:

Innovations in Team Teaching, Interdisciplinary Learning, and The Use of Technology

A Final Report on the Project

at the

Maine East High School

September 13, 1994

by

Principal Investigator: Dr. Jeffrey B. Hecht

TIER Lab Research Assistants:
Mr. David J. Dwyer
Ms. Nicole K. Roberts
Mr. Perry L. Schoon
Ms. A. Gigi Fansler

Technological Innovations in Educational Research Laboratory
Department of Educational Administration and Foundations
College of Education at Illinois State University

Table of Contents

Introduction and Projects Overview

The students, faculty, and administration at the Maine Township East High School engaged in an ongoing curricular innovation during the 1993-1994 academic year. This program investigated the notions of teacher teaming, interdisciplinary instruction, and the use of computer technology in the delivery of a core education in the subjects of Biology, World Cultures, English, and Algebra. The entire Freshmen class at Maine East High School was divided into three groups, with each group emphasizing certain of these features.

Project Homeroom

In this group, teachers were allowed time to work together as a team. They planned lessons together, and also worked to incorporate computers in their classes. Students in the Project Homeroom group were given computers to use in their homes for the duration of the project, and were able to use computer software (primarily word processing) for assignments and link with their teachers using electronics communications tools. Teachers were able to make use of this home-based technology, a dedicated in-school computer laboratory, common scheduling for the single group of students, and daily meetings to plan both single-subject and interdisciplinary units of instruction. There were 48 students in the Project Homeroom group.

Project Schoolroom

Teachers in the Project Schoolroom group were also allowed time during the school day to work together as a team. Like the Project Homeroom teachers they planned lessons together; however, these teachers did not have the same access to computer technology either in the school or in the student's homes. Teacher teaming, getting to know their students better, and an interdisciplinary approach are the main features of this group. Project Schoolroom was a mirror of Project Homeroom without the added computer and telecommunications technology. A total of 56 students were in the Project Schoolroom group.

Regular School

This was the control group against which the other two programs were baseline measured, and consisted of all students and teachers not participating in either the Project Homeroom or Project Schoolroom groups. These students received the traditional Maine East instruction from teachers following their usual lesson plans. No special equipment, other than what was normally available, was used by the students of these teachers. The Regular School group consisted of the remaining 478 students in the Freshman class.

This summary evaluation report is based on data collected throughout the 1993-1994 school year. It represents information gathered from two written surveys of all students in the entire Freshman class, interviews with teachers participating in the Project Homeroom and Project Schoolroom groups, and an evaluation of selected exemplar curricular products (including student projects). In addition student grades in each of the four courses under study, cumulative and term grade point averages, attendance records, student performance on criterion referenced examinations and student demographics were examined.

A Review of Relevant Literature

The efforts of the students, faculty, and staff at the Maine East High School involved the intersection of three important themes: the application of computers (and other technology) to high school education; the influence of teacher teaming, and team-based instruction, on student learning; and the impact of changing from a separate subject approach to learning to one that is more interdisciplinary in nature. Before one can understand the results from the Maine East effort it is important that these themes, and the meaning underlying each, be clarified. This section, therefore, is a brief review of the pertinent literature in each of these three areas. It is intended to orient the reader to dominant developments in the field, recent applications, and how these themes have been applied in other high school settings.

In the past 10 years, several governmental, educational, and private sector reports have addressed problems within the educational system in the United States (Boyer, 1985; Carnegie Task Force, 1986; Holmes Group, 1986; National Commission on Excellence in Education, 1983; Task Force on Federal Elementary and Secondary Education Policy, 1983). The reports indicate, in general, that education in this country is not serving the future needs of our country or our student population at a satisfactory level and that it is in need of revitalization.

To address the nation's educational problems, various suggestions have been made including: implementing year-round education, extending the school day, providing more money for education(Task Force on Federal Elementary and Secondary Education Policy, 1983), and developing a nationwide mandatory curriculum. On a more district-wide or school-wide basis, suggestions for improving education have included the integration of computer technology in teaching and learning situations (Riel, 1989) and the restructuring of schools to include teaming of teachers and interdisciplinary instruction (Whitford & Kyle, 1984). Like many educational innovations, the integration of technology, team teaching, and interdisciplinary instruction are being viewed as the newest tools for solving the problems of public elementary and secondary education (Rockman, 1993). The tendency for some in the educational establishment to seek out expedient solutions to difficult questions may be just the reason for the distortion, and even the reported failure, of any number of potentially meaningful curriculum and instructional innovations. Herein lies the challenge to administrators and education executives as they prepare to implement new programs and purchase new innovative technologies. How to decide which curricular and technological innovations really make a difference in schools?

Computers and Technology

In the world of school administrators, nothing has probably turned heads faster and inspired more questions than computers and technology. When school board members ask what the research says about computers in education, most often they want to know if it really makes a difference in learning. The answer, unfortunately, is less than clear cut.

For the past 20 years, much of the research on computers in education has dealt with the learning of basic skills using drill-and-practice software (Becker, 1987). This software is the kind that is usually found in integrated learning packages and stand-alone computer programs. Becker points out that most of these studies in the past are in many ways not relevant to us now. Many of the studies involved mainframe computers and minicomputers, not the microcomputers in use today. More recent studies have involved microcomputers that, due to the press of technological innovation, became outdated within as little as a year's time. Also, most of the software used in these studies was primitive compared to what might be available now, as cited by Rockman(1993) who said that the results of many of the recent studies have been unclear because the technology and accompanying software had advanced significantly before researchers had published their results.

The lack of studies involving up-to-date technology is just one of the problems of determining the effect of computers and technology on learning. To confound things further, the computer terms used in the studies (eg. computer-assisted instruction) have meant different things to different researchers. To some, the term computer-assisted instruction consists of any lesson that uses computers; to others, it's synonymous with drill-and-practice programs. There is remains what is meant by the phrase "measuring the effectiveness of the computers and technology on learning."

A large proportion of the studies on the effects of computers and technology on learning have used academic achievement as the measure (Brophy & Hannon, 1984; Cuban, 1986). The results of these studies have varied. Becker (1987), in his meta-analysis on the effects of computer use on children's academic achievement, reviewed 54 studies and eliminated 34 of them for reasons similar to those mentioned previously. In most cases these studies were not of dubious quality but, rather, were not applicable to today's schools. Of those that remained, Becker reported that all together the studies did not come close to providing any prescriptive data for deciding whether and how to use computers for instruction.

Regardless of the position that one takes, evidence is growing that emerging technologies can facilitate student learning (Kozma & Croninger, 1992). The strongest argument for incorporating computers into the classroom that is proposed in the literature suggests that teachers can use computers to create a functional learning environment (Riel, 1989). Classrooms are places where students practice skills that will someday, in some manner, serve them in the adult world. More often than not students are required to practice skills over and over again without any understanding of how those skills relate to the overall scheme of their skill development. A frequently asked questions during a typical school day is often: Why do I have to learn that? The student (and, by extension, their parents and the whole of society) is placing their trust in the hands of their teachers. Some teachers will respond by saying that it is part of the curriculum or that the student needs to trust them because they will inevitably need that skill later. This may result in students responding with an almost machine like functioning and bored attention -- a decontexualized learning. When technology is incorporated as an integral part of the overall learning process, however, it appears that motivation is maintained and interest upheld.

As mentioned previously, most new studies conducted to substantiate the value of computer-based approaches are inadequate for today's schools. Most importantly, they do not examine the possibility of varying instructional approaches and delivery or changes in organizational structure. As often as technology is suggested to be the cure for education, it is still only a tool to be used by a teacher. While new equipment can make technology accessible to students and teachers, however, it does not change the tenor of the school day. Some might argue that for true changes to occur, the structure of the school day must be altered. One such innovation that many schools are employing to alter school day structure is teacher teaming.

Teacher Teaming

Team teaching is not all that new to the field of education. Researchers and educators have documented interest in the concept of a teamed approach since the early 1960's. Chaplain (1964), a pioneer of teacher teaming, saw great merit in teachers working informally together in planning a curriculum, arranging for visitations to each other's classes, exchanging information about students they teach in common, and trading secrets among themselves. Today's concept of teacher teaming has teachers from different subject areas organized into groups of varying numbers with an assigned common area of the school plant, a common schedule, and the responsibility for a common group of students (Meichtry, 1990). The expectation is that the team will work collectively and share resources to provide a broadened range of learning activities and opportunities for children (Schmuck & Runkel, 1985). This type of organizational structure is in radical opposition to the isolated departmental arrangement typically found in most schools. This isolation impedes teachers' access to others' knowledge and experience, and to shared work discussion. Researchers such as Cohen (1981) and Little (1982) have found that the bureaucratic, "cellular" structure of schools creates a situation where teachers work in isolation from their colleagues. As a result teachers lack a shared technical culture of teaching, are deprived of the professional help and support of their colleagues, and are plagued by feelings of uncertainty about their ability to improve student learning.

Many of the studies which have been conducted on teaming have focused on the effects and benefits it has had on teachers, not students. Whitford and Kyle (1984) summarized and collapsed these benefits to a list of five effects:

(1) teaming seems to lead to increased communication about students
(2) teaming seems to lead to an increased integration of curriculum across disciplines and to some lowered status to department-based decisions
(3) teaming seems to lead to more teacher autonomy with regards to decision making
(4) teaming seems to lead to more cohesiveness among teachers within a team, and
(5) teaming seems to provide an excellent mode for staff development.

So how do these benefits to teachers impact student learning? One argument put forth as far back as 1969 by James Meyer suggested that team teaching had the potential as the vehicle essential for the transformation of interdisciplinary teaching from the state of theory to one of fact. Extending the teaching competencies of the staff through group interaction and process sharing, is it believed, improves the quality of instruction received by students. Another argument for implementing teaming suggests that happy and motivated teachers, as a result of the positive effects that teaming has on them, will foster increased student learning. Costello (1987) supported this claim by suggesting that the single most important influence upon student learning was not a handsomely functional building, a wealth of curriculum materials, or the state of the equipment, but rather the competence of the classroom teachers and their motivation to perform.

Interdisciplinary Instruction

Team teaching and the interdisciplinary philosophy are closely related and are probably the most sought after aspects of schools that are attempting to integrate subject matter (Coppock & Hale, 1977). In contrast to a discipline-field based view of knowledge held by the majority of schools across the United States, the interdisciplinary philosophy does not stress delineations but linkages. It is a "knowledge view and curriculum approach that consciously applies methodology and language from more than one discipline to examine a central theme, problem, topic, or experience" (Jacobs, 1989, p. 8).

While interdisciplinary instruction is becoming more common in today's schools, its viability as an instructional approach needs to be investigated. One method of studying the effectiveness of interdisciplinary instruction is to measure it in terms of student achievement. In 1978, R.W. Scholz reviewed 65 studies that had been conducted on team teaching and interdisciplinary instruction in the United States. Of the 65 studies reviewed, 36 found no significant differences between the achievement of team-taught interdisciplinary classes and traditionally taught classes, 19 found differences favoring interdisciplinary classes, and 11 found differences favoring the traditional approach (Scholz, 1978). More recent research has produced similarly inconclusive results (Cotton, 1982).

It would appear that if a decision is made to adopt or to maintain an interdisciplinary approach, that decision should possibly be made on grounds other than hoped-for achievement increases. Other measures of effectiveness may include positive student attitudes, self-esteem, or other affective outcomes. When looking at the research on interdisciplinary instruction and affective outcomes, a different picture emerges from that revealed by an inquiry into achievement differences. Cotton (1982), in her review of research studies on interdisciplinary instruction, found 6 reports which favored interdisciplinary instruction over discipline based instruction with regard to affective outcomes such as self-concept, happiness with school, attitude toward teachers, interest in school subject matter, sense of personal freedom, and a sense of influence on the school environment and self reliance.

The research on the effectiveness of interdisciplinary instruction, as compared with traditional one-teacher, one-classroom arrangements, generally indicates that these two formats are equally effective in enhancing student achievement. Most studies do not reveal significant differences between their effects. However, with regard to affective outcomes, interdisciplinary instruction is favored by a large number of reviewed studies and has been shown to be effective in increasing student motivation and interest in school.

Summary of the Literature

It is possible to remain excited about the potential benefits that computers, team teaching and interdisciplinary instruction may have on student learning, but at the same time to demand that evidence be gathered that supports the implementation of these innovations. The integration of technology provides today's students and teachers with the tools necessary to understand today's world. Teacher teaming and interdisciplinary instruction are innovations which encourage structural change. It might be suggested that without structural change, the impact of technology integration may be minimal. The existing literature that has been conducted to substantiate the values of these two strategies are both outdated and incomplete.

There is substantial agreement in our country that education has deteriorated and is not serving the nation's needs or our student population at any reasonable level. In response to this growing problem, schools including Maine East, have taken on the responsibility of restructuring to include teaming of teachers, interdisciplinary instruction, and the use of computers and other educational technologies in their classrooms. Teacher teaming has widely been regarded as having great benefits to teachers. It appears as though these benefits have been more assumed than investigated. The literature is also scarce on the actual impact it has on student achievement levels. On the other hand, there is a plethora of studies indicating that using computers in classrooms coupled with the use of interdisciplinary instruction improves student achievement. Many good resources exist which can help schools and districts to decide whether the implementation of technology and utilization of team teaching and interdisciplinary instruction is desirable and workable for them. All of these materials generally emphasize the importance of carefully weighing the advantages and disadvantages of these educational innovations before choosing to make organizational changes of great magnitude. It is towards these issues that this report is directed.

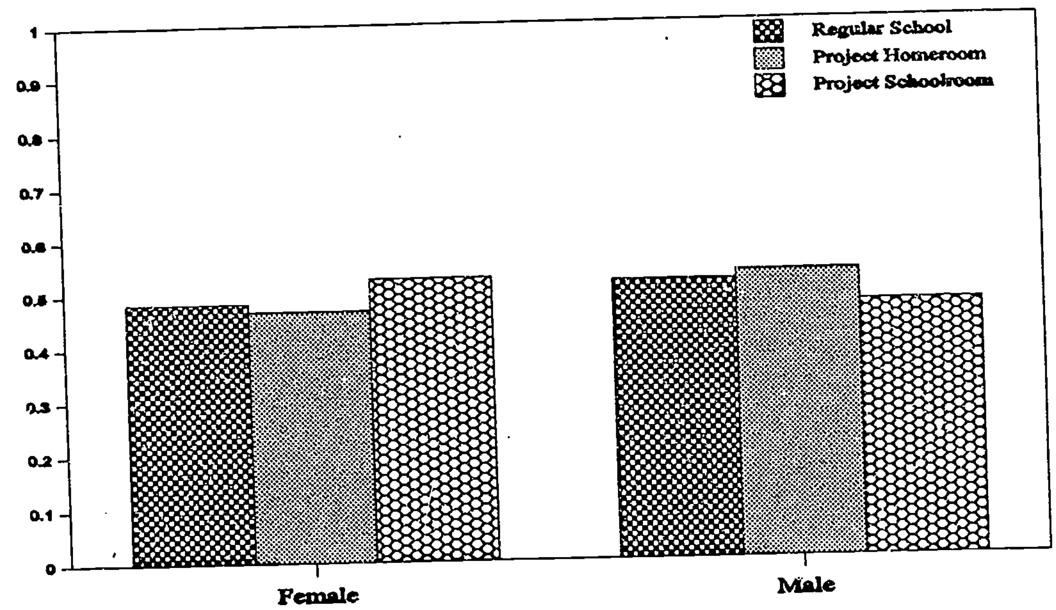
Are the Student Subject Groups Equal?

The first question to be addressed was whether the students participating the Project Homeroom, Project Schoolroom, and Regular School groups were equivalent in regards to their demographic characteristics. Three demographic characteristics were considered: student gender, student ethnicity, and student prior ability (subject-specific knowledge when entering the ninth grade). Specific attention had been given by the Maine East administration to establishing parallel groups using a modified stratified random assignment prior to the start of the year. If significant differences between the groups were, nonetheless, found to exist, such differences might bias any achievement gains exhibited by one (or more) of the groups. To insure that all *a priori* group differences were incorporated into later analyses the evaluation team first looked at the distribution of student gender, ethnicity, and initial Criterion Referenced Test scores in Biology, Algebra, and World Cultures (CRTs were not administered in English). While no group was exactly equal to any other group on these measures, we found that there were no meaningful differences between the groups on these indicators.

Gender

In the case of gender, all three groups were not statistically significantly different from each other (see Figure 1). Males and Females were represented in statistically equal portions (χ^2 = .049 $\underline{df}$ = 2, $\underline{p}$ = .976) in the Project Homeroom, Project Schoolroom, and Regular School groups. In each case there were slightly more male than female students.

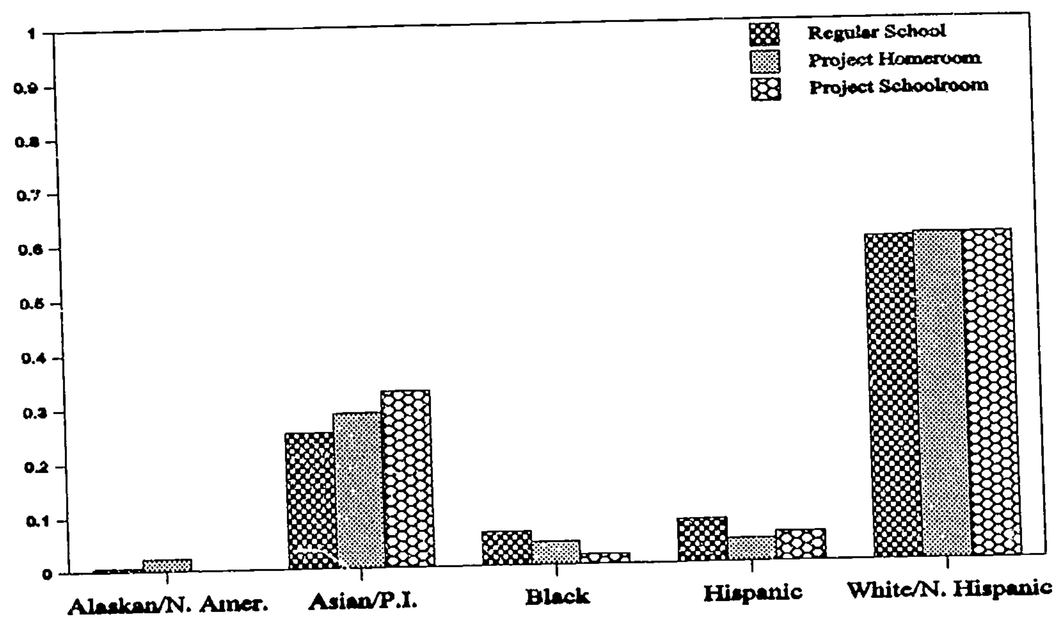
Figure 1: Percent of Students by Gender



Ethnicity

We also found no statistically significant differences ($\chi^2 = 6.10$, $\underline{df} = 8$, $\underline{p} = .636$) in the distribution of student ethnic mix between the three project groups (see Figure 2). Of the five ethnic groups distinguished, a statistically equal percentage of students were represented in Project Homeroom, Project Schoolroom, and the Regular School groups.

Figure 2: Percent of Students by Ethnicity

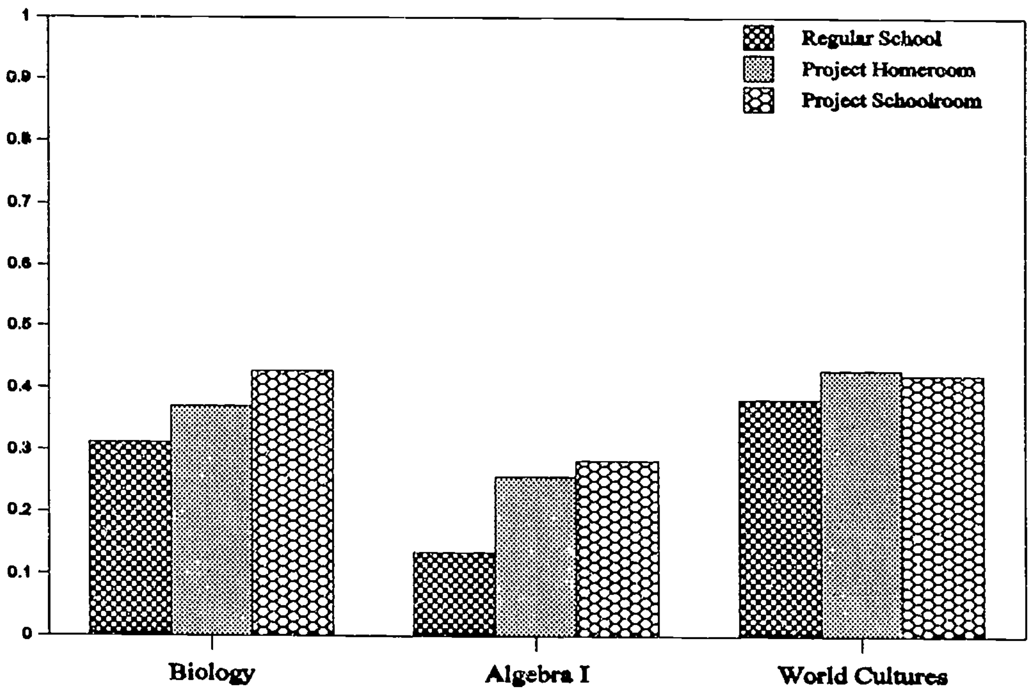


Baseline Criterion Referenced Tests

CRTs were given in Biology, World Cultures, and Algebra I at the beginning of the school year. There were several statistically significant, although generally not meaningfully large, differences between the groups on the beginning of the year Criterion Referenced Test percent scores. Project Schoolroom ($\bar{X}$ = 42.8%) students scored statistically significantly higher than both Project Homeroom ($\bar{X}$ = 37.1%) and Regular School ($\bar{X}$ = 31.3%) students in the Biology CRT, and Project Homeroom students scored statistically significantly higher than the Regular School students (F = 18.26, df = 2,373, p = .000). On the Algebra I CRT both Project Homeroom ($\bar{X}$ = 25.7%) and Project Schoolroom ($\bar{X}$ = 28.3%) students scored statistically significantly higher than the Regular School ($\bar{X}$ = 13.5%) students, although there was no statistical difference between the Project Homeroom and Project Schoolroom scores (F = 68.01, df = 2,197, p = .000). Scores on the World Cultures CRT followed the same pattern as those for the Algebra I CRT, with both Project Homeroom ($\bar{X}$ = 42.9%) and Project Schoolroom ($\bar{X}$ = 42.1%) students scoring statistically significantly higher than the Regular School ($\bar{X}$ = 38.2%) students and no statistical differences between the Project Homeroom and Project Schoolroom score averages.

Overall the Regular School students tended to score lower on these initial CRT tests (see Figure 3). We believe that this difference is due primarily to the fact that the Regular School group was larger and more varied in ability than the other two groups. Further, while the above differences are statistically significant, these differences account for an extremely small percentage of the total variability in CRT score.

Figure 3: CRT Averages (Percent) - Fall, 1994



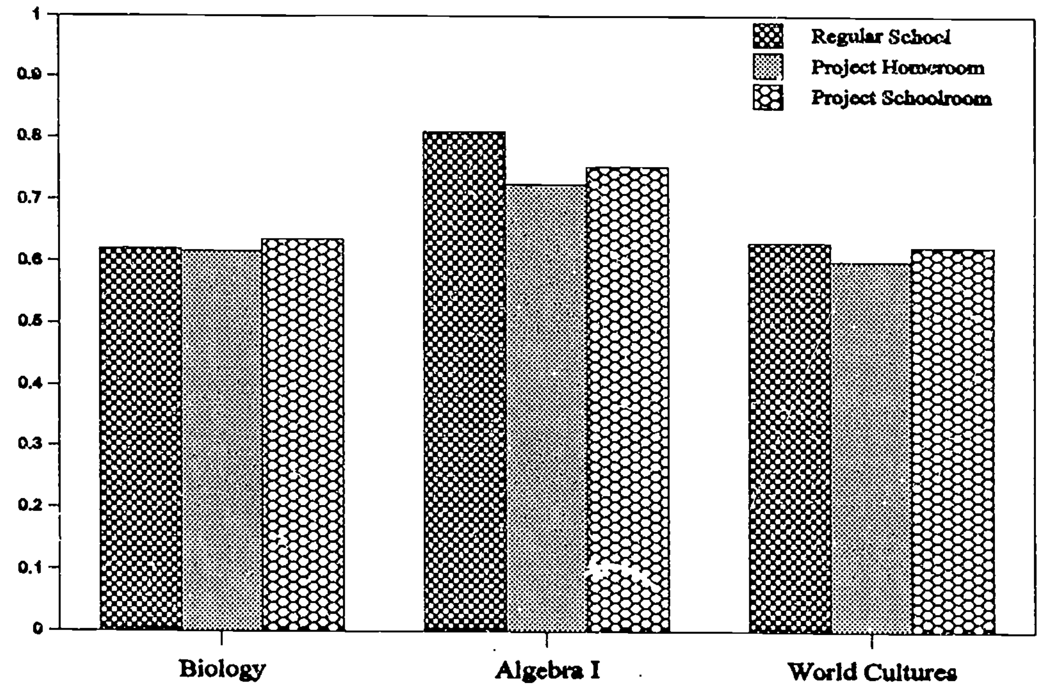
District Goals: Student Outcomes

Ten outcome goals were identified by the District as important for the students in both the Project Homeroom and Project Schoolroom groups. The following reports the available data for each of these goals. Whenever possible, we have attempted to insure that simple univariate results were not confounded by the individual or interactive influence of either student gender, student ethnicity, or prior academic ability (as measured by the beginning of the year criterion referenced test in that subject area).

1. All students will master basic skills in the area of Algebra I as evidenced by student performance of at least 70% on a criterion-referenced test. (The building average is 65%.)

The initial Algebra I CRT was administered at the beginning of the year (see Figure 3). Although these test scores were considerably lower than the proposed outcome, this is understandable for a criterion referenced test administered prior to the start of any instruction. Students do not typically score well on a criterion referenced test when they have not been taught the material. CRT percent scores from the end of the year (for all subjects tested) are reported in Figure 4.

Figure 4: CRT Averages (Percent) - Spring, 1994



Regular School ($\overline{X}$ = 80.87%) students scored statistically significantly higher (F = 5.77, df = 2,163, p = .0038) than both their Project Homeroom ($\overline{X}$ = 72.44%) and Project Schoolroom ($\overline{X}$ = 75.32%) counterparts. There was no statistical difference between the average scores of the Project Homeroom and Regular School student groups. On average students in all three groups accomplished District Goal number one of achieving a performance of at least 70% on the criterion-referenced test in Algebra I. However, 14 out of the 69 (20.3%) Regular School students that took the Spring, 1994 CRT test, 15 out of 42 (35.7%) Project Homeroom students tested, and 17 of the 55 (30.9%) Project Schoolroom students tested achieved lower than the desired 70% goal level.

All three groups demonstrated a statistically significant increase from beginning of the year CRT to the end of the year CRT in all three areas tested: Regular School ($t = 26.9$, $p < .000$); Project Homeroom ($t = 20.8$, $p < .000$); and Project Schoolroom ($t = 22.2$, $p < .000$). This is not surprising, given the nature of the criterion referenced test, the before-to-after examination, and the relationship of the test to the curricular material. Overall, Regular School students showed the greatest average increase in Algebra I CRT performance ($\overline{X} =$ 54.3% gain), over both Project Homeroom students ($\overline{X} = 47.2\%$ gain) and Project Schoolroom students ($\overline{X} = 45.8\%$ gain). Multivariate Analysis of Variance revealed that this difference was statistically significant ($F = 9.026$, $df = 5,133$, $p < .000$); however, this difference was explained <u>not</u> by which group the students were in but rather by the student's initial CRT score (F(covariate Fall CRT) = 22.56, $p < .000$). In essence, students in the Regular School group achieved the highest amount of gain (statistically significantly different than the other two groups) because those students scored the lowest at the beginning of the year and, therefore, had more gain possible to achieve. With beginning of the year CRT score considered there was no statistically significant difference between the Regular School, Project Homeroom, and Project Schoolroom students' amount of increased performance.

Additional questions were added to the end-of-the-year criterion referenced test to address the special material covered through the use of the computer in the Project Homeroom (and, to some degree, the Project Schoolroom) group(s). This created three different pools of tests from which comparisons could be made: between the three groups on the "standard" CRT questions (reported above), between the three groups on the "added" CRT questions, and between the three groups on all of the questions (the standard question pool and the added questions together). Both Project Homeroom ($\overline{X} = 61.90\%$) and Project Schoolroom ($\overline{X} =$ 58.73%) students scored statistically significantly higher ($F = 74.67$, $df = 2,163$, $p < .000$) than the Regular School ($\overline{X} = 22.32\%$) students on the "added" CRT questions. There was no statistical difference, however, between the Project Homeroom and Project Schoolroom average scores on these additional CRT items, even though the Project Homeroom group's score was somewhat greater than that of the Project Schoolroom group. When all questions were considered, both the standard questions and the additional questions, there was no statistically significant difference between the three groups ($F = .84$, $df = 2,163$, $p = .4317$). Regular School students averaged 69.16%, Project Homeroom students averaged 70.33% and those students in Project Schoolroom averaged 72.0%.

2. All students will master basic skills in the area of writing as evidenced by student performance improvement of at least .5 points on the pre- and post- writing sample. (The writing sample is scored on a rating scale from 1 to 6 points and the building average is 4.0.)

The English Writing Assessment was given to students in each of the three groups. Five different scores were generated: Focus, Support, Organization, Convention, and Integration. The average scores for each group are given in the table below.

	Focus	Support	Organization	Convention	Integration
Regular School	4.56	4.43	4.31	3.85	4.29
Project Homeroom	4.84	4.60	4.55	3.88	4.47
Project Schoolroom	4.70	4.87	4.70	3.95	4.56

Overall, the students in Project Schoolroom achieved higher scores in each of the marked areas except for Focus, in which the students from the Project Homeroom group averaged higher. In the same way students from the Project Homeroom group averaged higher scores than those in the Regular School group. Unfortunately, statistical tests could not be performed on this data so the degree of difference, and its statistical significance, is unknown.

3. All students will master basic skills in the area of World Cultures as evidenced by student performance of at least 70% on a criterion-referenced test. (The building average is 60%.)

The initial Criterion Referenced Test in World Cultures was given at the beginning of the 1993-1994 school year (see Figure 3). Spring, 1994 CRT scores were improved over the beginning of the school year scores (see Figure 4). Although there were minor differences between the three groups average end-of-year CRT score (Regular School $\overline{X} = 62.96\%$, Project Homeroom $\overline{X} = 60.05\%$, and Project Schoolroom $\overline{X} = 62.32\%$) these differences were not statistically significant ($F = .65$, $df = 2{,}177$, $p = .5225$). Unfortunately, none of the three student groups achieved an average CRT score in World Cultures above the desired goal of 70%. 54 of the 82 (65.9%) of the Regular School students who took this CRT, 32 of the 43 (74.4%) of the Project Homeroom students, and 37 out of the 55 (67.3%) Project Schoolroom students scored lower than the desired 70% goal.

On average, all three groups demonstrated a statistically significant increase in World Cultures CRT score from the beginning of the year to the end of the year: Regular School ($t = 18.0$, $p < .000$); Project Homeroom ($t = 13.6$, $p < .000$); and Project Schoolroom ($t = 17.0$, $p < .000$). Regular School students showed the greatest average increase in World Cultures CRT performance ($\overline{X} = 22.6\%$ gain), over both Project Homeroom students ($\overline{X} = 16.9\%$ gain) and Project Schoolroom students ($\overline{X} = 19.8\%$ gain). Multivariate Analysis of Variance revealed that this difference was statistically significant ($F = 2.331$, $df = 5{,}151$, $p = .045$) and that the difference observed was attributable solely to the differences between the Regular School, Project Homeroom, and Project Schoolroom groups. No effect from student gender, ethnicity, or beginning of the year CRT score was statistically significant.

Differences between the groups were noted, however, when only the additional CRT questions were considered. Project Homeroom students ($\overline{X} = 81.12\%$) and Project Schoolroom students ($\overline{X} = 78.47\%$) both scored statistically significantly higher ($F = 143.57$, $df = 2{,}180$, $p < .0000$) than students in the Regular School group ($\overline{X} = 48.47\%$). When both the standard questions and the additional questions were considered, Project Schoolroom students ($\overline{X} = 65.07\%$) outperformed both their Project Homeroom ($\overline{X} = 63.63\%$) and

Regular School ($\bar{X}$ = 60.50%) counterparts. This difference, however, was not statistically significant (F = 2.35, df = 2,177, p = .0988).

4. All students will master basic skills in the area of Biology as evidenced by student performance of at least 70% on a criterion-referenced test. (The building average is 63%.)

As before, the initial CRT average scores are reported in Figure 3 while the end-of-year CRT percent averages are pictured in Figure 4. While the Project Schoolroom students achieved the highest average Biology CRT score (63.45%), this was not statistically significantly different (F = .2778, df = 2,358, p = .7576) from the averages achieved by either the Project Homeroom students (61.56%) or the Regular School students (61.97%). Neither Regular School, Project Homeroom, nor Project Schoolroom had an average end-of-year CRT score at or higher than the desired goal of 70%. Of the 263 Regular School students who took the Spring, 1994 CRT in Biology, 167 (63.5%) scored below the desired 70% goal level. 30 of the 43 (70.0%) of the Project Homeroom students also scored below this level and 36 of the 55 (65.5%) of the Project Schoolroom students achieved lower than the goal of 70% achievement of this CRT.

As with the other criterion referenced tests all three groups demonstrated a statistically significant increase in Biology CRT score from the beginning of the year to the end of the year: Regular School (t = 31.5, p < .000); Project Homeroom (t = 15.6, p < .000); and Project Schoolroom (t = 17.2, p < .000). Regular School students showed the greatest average increase in Biology CRT performance ($\bar{X}$ = 31.1% gain), over both Project Homeroom students ($\bar{X}$ = 24.0% gain) and Project Schoolroom students ($\bar{X}$ = 19.8% gain). Multivariate Analysis of Variance revealed that this difference was statistically significant (F = 19.514, df = 5,292, p < .000) and that the difference observed was attributable to a combination of the student's beginning of the year CRT score and which group they were in. It appears from the data that students in the Regular School group gained the most as they had the most potential for gain (theirs was the lowest initial CRT score). Likewise, the Project Homeroom students gained a significant amount from the beginning of the year to the end of the year, even though their end-of-year scores were, on average, below those of the students in the Project Schoolroom group. While Project Schoolroom students started the year with the highest CRT scores they also ended the year with the highest CRT scores, due to this combination of both initial high CRT performance and Project Schoolroom effects.

When the added questions for Biology were the only questions considered, Project Schoolroom students ($\bar{X}$ = 62.36%) achieved a statistically significantly higher average score (F = 22.37, df = 2,360, p < .0000) than both their Project Homeroom ($\bar{X}$ = 53.26%) and Regular School ($\bar{X}$ = 46.15%) counterparts. Furthermore, the Project Homeroom students' average was statistically significantly greater than that of the Regular School students. This difference, however, was not sufficiently large when the additional questions were combined with the standard CRT questions. In that case, although the Project Schoolroom students ($\bar{X}$ = 63.36%) continued to have a higher average CRT score than both the Project Homeroom ($\bar{X}$ = 60.80%) and Regular School ($\bar{X}$ = 60.54%) students, this difference was not large enough to be considered statistically significant (F = .9447, df = 2,358, p = .3128)

5. All students will master basic skills in the area of computer usage on a performance test. After an orientation to the program, students will be expected to achieve a score of 75% on the test. They will score a minimum of 75% before receiving their computers. Each student will produce a final portfolio which will be evaluated by a rating scale. 75% of the students will be expected to achieve a score of 3 or better on a 5 point scale. Each student will produce a final portfolio with examples of projects that include:

A. **Word processing**
B. **Database**
C. **Spreadsheet**
D. **Bulletin Board/E-mail**
E. **Multi-Media**

At the beginning of the school year students in the Project Homeroom group were given two tests before being allowed to take a computer home. One was a performance test, where students were required to assemble the components of the computer system; retrieve, modify, and save a computer file; then disassemble the computer system and return the components to their boxes. All students mastered this outcome. Students were also given a written, multiple choice test on which they were required to score 75% in order to receive their computer. All students achieved this criterion.

At the end of the school year students in the Project Homeroom group were graded on a Technology Portfolio, work contained on a diskette turned in to and evaluated by one of the Project Homeroom teachers. This portfolio could contain as many as seven different items: "Project One" (a multimedia project of digitized pictures and text), "Haiku" (a multimedia project involving graphic artwork painted by the student and text), "Book Review" (a multimedia project also involving graphic artwork and text), "Stock Report" (a data analysis and presentation project utilizing spreadsheets and word processing), "Learning Labs I & II" (another project involving word processing, spreadsheets, and the creation of charts and graphs), "Shakespeare Research" (primarily a word processing task), and "History Project" (a multimedia project with graphics, digitized images from laser disk, still pictures, and text). While most of the students attempted each project not all students demonstrated evidence of each and every project as part of their technology portfolio. Project Homeroom students averaged a score of 4.131 (out of a possible of 7) on this component. This resulted in an average performance of 59%, not statistically significantly different from the 3 out of 5 (or 60%) target goal.

6. All students will spend an average of one hour a day in out-of-school school-related structured activities. This will be documented through a bulletin board activity report.

According to Brad Waggoner, District Technology Specialist, a combination of technical difficulties and other district-wide priorities prevented the bulletin board activity tracking program from becoming operational during the Fall, 1993 semester. The evaluation plan called for this tracking software to collect bulletin board usage data; therefore, we are unable to comment on bulletin board usage from direct access data. To our knowledge, this tracking system was never implemented during the 1993-1994 school year.

The evaluation team did, however, have other out-of-school school-related structured activity measures available. In responding to a written survey given during the semester, students reported that they did, on average, engage in at least an hour each day in out-of-school school-related structured activities. There were no statistically significant differences between the students in the Project Homeroom, Project Schoolroom and Regular School groups in the way they spent their time out of school. While students spent most of their time during the week in structured and unstructured out-of-school activities, they reported spending the largest single blocks of time during a typical week engaged in school-sponsored sports programs.

7. All students will communicate with their teachers or log on to the school network at least once a week as evidenced by a bulletin board activity report.

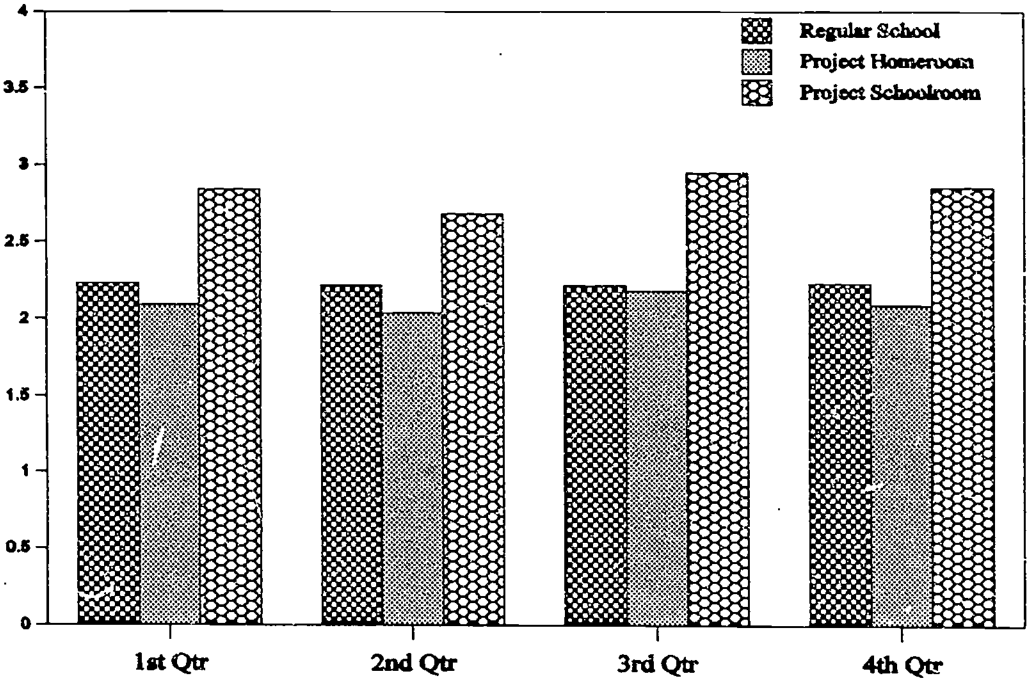
As in goal 6 above, the non-operational bulletin board activity reporting program prevented the direct documentation of this goal. Instead, the evaluation team relied on teacher interviews and student survey responses to ascertain the level of student-teacher communication and/or school computer network usage. These anecdotal reports indicated that students tended to engage in at least one communication activity each week. The teacher reports are supported by student written surveys which tended to confirm, for the Project Homeroom group, at least this minimum level of activity.

8. All students will demonstrate a successful transition into high school as evidenced by:

- **A. A C average by a greater percentage of Project Homeroom students than an equivalent group of freshman students.**
- **B. An average attendance rate of 95% as measured by attendance records a the end of the freshman year. (The building average is 93.2%.)**

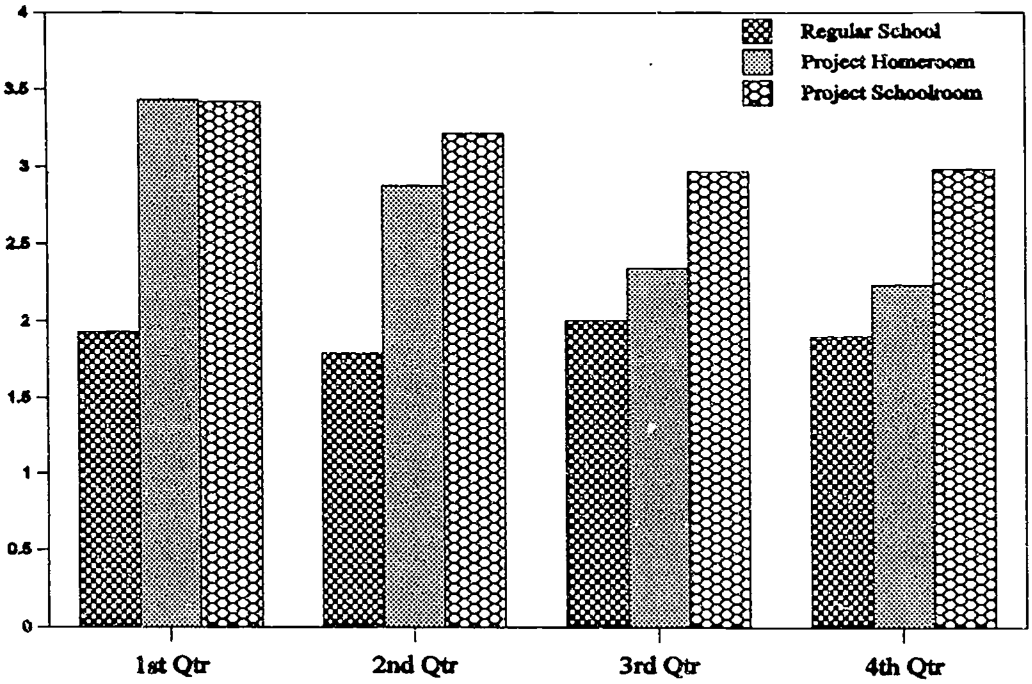
Grade comparisons were made between the students in the Project Homeroom, Project Schoolroom, and Regular School groups for all students taking the core courses of English I (Figure 5), World Cultures (Figure 6), Algebra I (Figure 7), and Biology I (Figure 8) for each of the four grading quarters during the 1993-1994 school year. In addition, two different forms of the students' grade point averages were considered: the first GPA included all courses taken for high school credit, while the second focused only on those students from whom a GPA could be computed using just the four subjects studied (English I, World Cultures, Algebra I, and Biology I). These data are reported in Figure 9.

Figure 5: Average Grades - English I



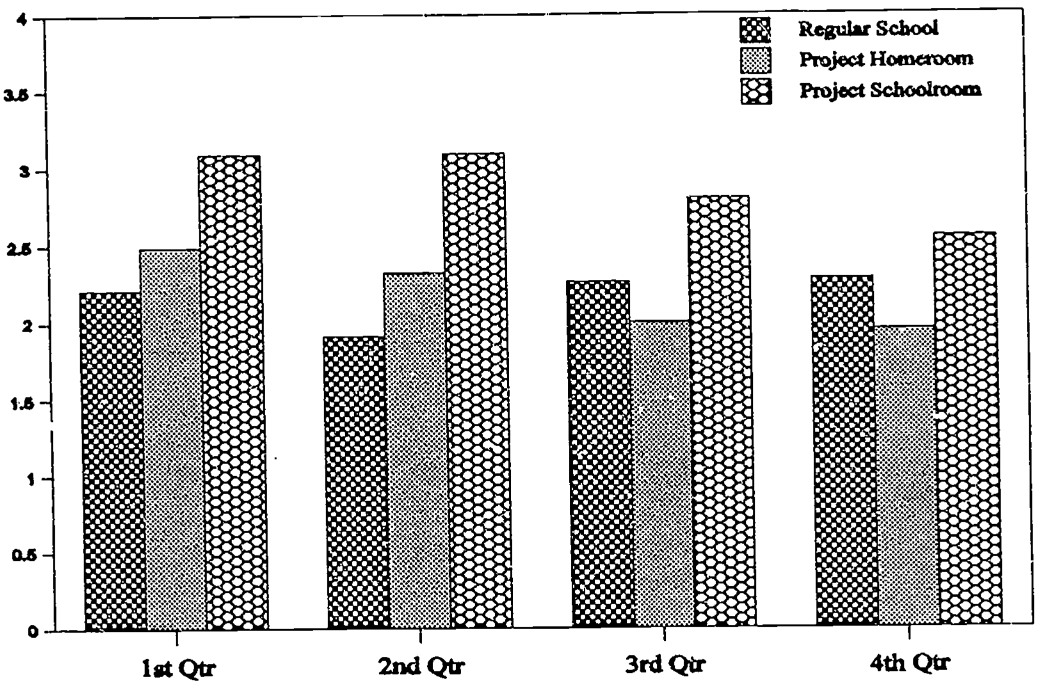
Student first quarter grades in English showed Project Schoolroom ($\overline{X}$ = 2.23) students with statistically significantly higher grades (F = 8.81, df = 2,301, p < .000) than students in both the Project Homeroom ($\overline{X}$ = 2.09) and Regular School ($\overline{X}$ = 2.23) groups, with no statistical difference between the Project Homeroom and Regular School average grades. Student second quarter grades in English showed Project Schoolroom ($\overline{X}$ = 2.22) students outperforming Project Homeroom ($\overline{X}$ = 2.04) and Regular School ($\overline{X}$ = 2.68) students, with no difference between the average grade of Project Homeroom and Regular School students (F = 5.02, df = 2,305, p = .007). Third quarter English grades again showed Project Schoolroom students ($\overline{X}$ = 2.95) outperforming both their Project Homeroom ($\overline{X}$ = 2.18) and Regular School ($\overline{X}$ = 2.22) peers, with no statistical difference between Project Homeroom and Regular School averages (F = 7.85, df = 2,299, p < .000). Fourth quarter grades repeated the same pattern, with Project Schoolroom English students ($\overline{X}$ = 2.85) having higher grades than both the Project Homeroom ($\overline{X}$ = 2.09) and Regular School ($\overline{X}$ = 2.23) students. Again, there was no statistical difference between the Project Homeroom and Regular School students (F = 7.05, df = 2,300, p = .001).

Figure 6: Average Grades - World Cultures



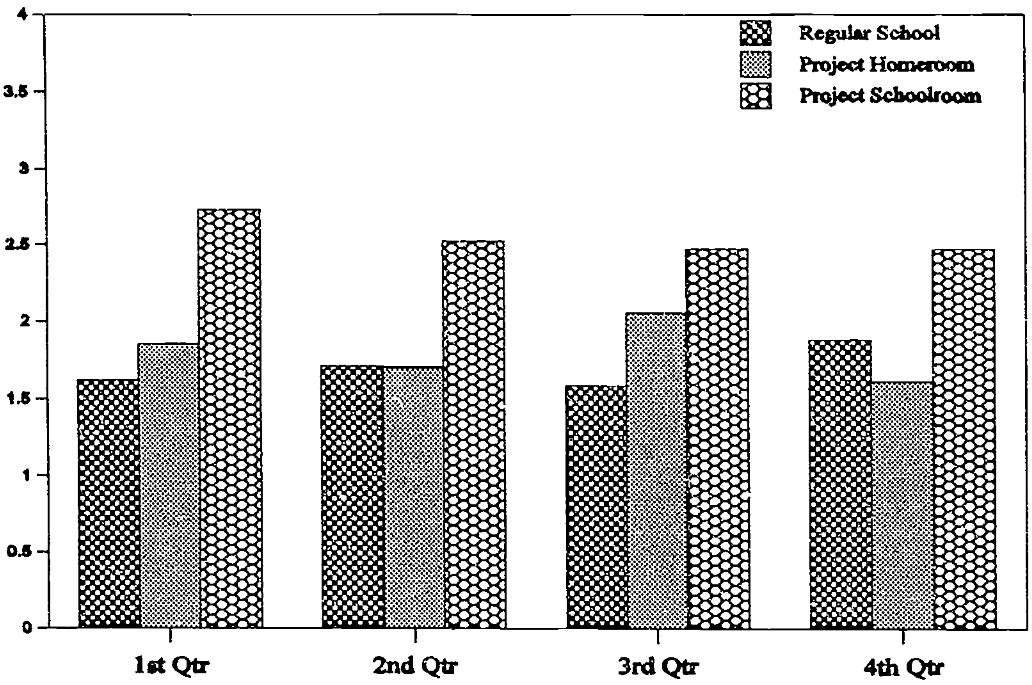
In the first quarter both Project Schoolroom ($\overline{X} = 3.42$) and Project Homeroom ($\overline{X} = 3.43$) students had higher average grades in World Cultures than their Regular School ($\overline{X} = 1.93$) counterparts ($F = 48.67$, $df = 2,189$, $p < .000$). In the second grading quarter students in both the Project Schoolroom ($\overline{X} = 3.21$) and Project Homeroom ($\overline{X} = 2.87$) World Cultures groups outperformed their Regular School ($\overline{X} = 1.79$) counterparts ($F = 37.50$, $df = 2,190$, $p < .000$). In neither the first nor the second quarter grades were the average grades in World Cultures for the Project Homeroom students statistically significantly different from the average grades for the Project Schoolroom students. In the third quarter, however, the pattern changed, with the Project Schoolroom students ($\overline{X} = 2.96$) having grades statistically significantly higher than both the Project Homeroom students ($\overline{X} = 2.34$) and the Regular School students ($\overline{X} = 2.00$). The average grades for the Project Homeroom students were not statistically significantly different from the grades for the Regular School students ($F = 18.16$, $df = 2,183$, $p < .000$). Project Schoolroom students continued to outperform their peers into the fourth quarter grading period ($\overline{X} = 2.98$), having statistically significantly higher grades than both the Project Homeroom students ($\overline{X} = 2.23$) and the Regular School students ($\overline{X} = 1.90$). As before, there was not a statistically significant difference between the Regular School and Project Homeroom groups ($F = 19.91$, $df = 2,180$, $p < .000$).

Figure 7: Average Grades - Algebra I



Project Schoolroom ($\overline{X}$ = 3.09) students in Algebra I had a higher average first quarter grade than both the Project Homeroom ($\overline{X}$ = 2.49) and Regular School students ($\overline{X}$ = 2.21), with no differences noted between the Project Homeroom and Regular School average (F = 10.39, df = 2,189, p < .000). In the second quarter Algebra I Project Schoolroom students ($\overline{X}$ = 3.09) again outperformed both Project Homeroom ($\overline{X}$ = 2.32) and Regular School ($\overline{X}$ = 1.91) students (F = 20.45, df = 2,193, p < .000). In this case, however, Project Homeroom students' average grades were statistically significantly higher than those of the students in Regular School. Third quarter grades showed a slight reversal, with Project Schoolroom students ($\overline{X}$ = 2.80) again outperforming both their Project Homeroom ($\overline{X}$ = 2.00) and Regular School ($\overline{X}$ = 2.26) counterparts. While the difference between the Project Homeroom and Regular School students in third quarter Algebra I grades was not statistically significant, this was the first time that the Regular School students had achieved a higher grade average than the Project Homeroom students. The fourth quarter grades continued this trend, with Project Schoolroom students ($\overline{X}$ = 2.55) statistically significantly outperforming the Project Homeroom students ($\overline{X}$ = 1.95). While Project Schoolroom students also had higher grades than the students in Regular School ($\overline{X}$ = 2.28), this difference was not large enough to be considered statistically significant.

Figure 8: Average Grades - Biology

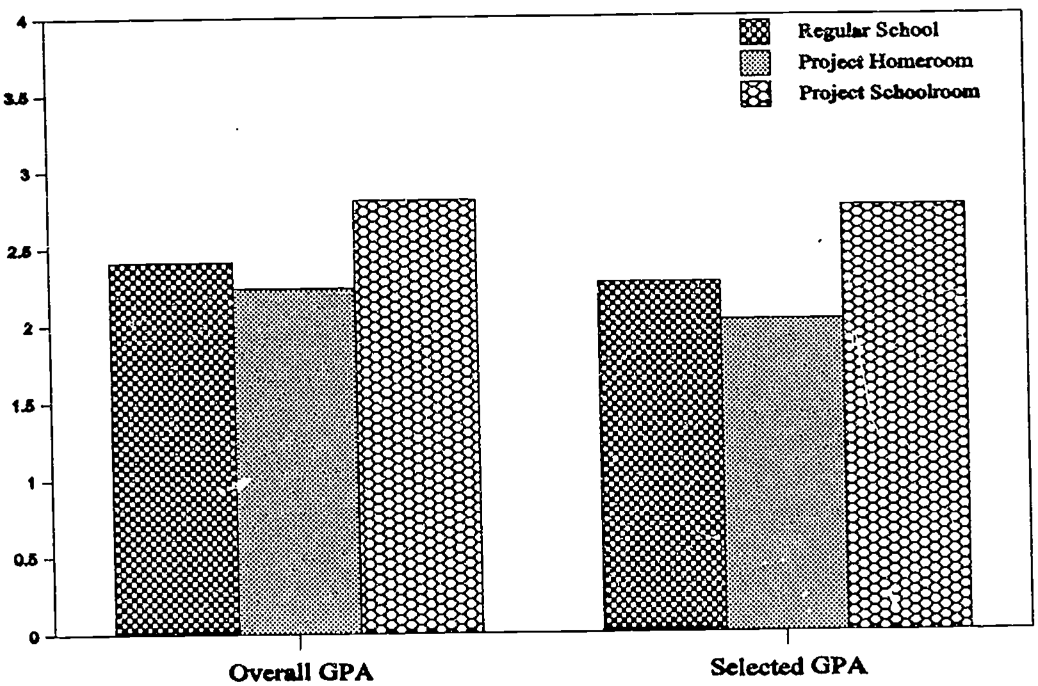


Finally, Biology first quarter averages revealed that Project Schoolroom ($\overline{X} = 2.73$) students outperformed both their Project Homeroom ($\overline{X} = 1.85$) and Regular School ($\overline{X} = 1.62$) counterparts ($F = 20.03$, $df = 2{,}337$, $p < .000$). The average grades of the Project Homeroom students were not statistically significantly different from those of the Regular School students. In the second quarter students taking Biology showed the greatest achievement in the Project Schoolroom group ($\overline{X} = 2.52$), as compared to the Project Homeroom ($\overline{X} = 1.70$) and Regular School ($\overline{X} = 1.71$) groups ($F = 10.96$, $df = 2{,}340$, $p < .000$). As in the first quarter the average grades of the Project Homeroom students were not statistically significantly different from those of students in the Regular School group. Third quarter grades revealed that Project Schoolroom students ($\overline{X} = 2.47$) again outperformed their Project Homeroom ($\overline{X} = 2.05$) and Regular School ($\overline{X} = 1.58$) peers. In addition, the Project Homeroom student average was statistically significantly higher than the Regular School average ($F = 15.58$, $df = 2{,}327$, $p < .000$). Finally, the analysis of fourth quarter grades showed that Project Schoolroom students ($\overline{X} = 2.47$) again outperformed their peers in both Project Homeroom ($\overline{X} = 1.61$) and Regular School ($\overline{X} = 1.88$). While the average grades for the Project Homeroom students were lower than grades for the Regular School students that difference was not statistically significant.

Comparison of these averages revealed a pattern of students in the Project Schoolroom group consistently outperforming their Project Homeroom counterparts across every subject and in virtually every grading period. Project Homeroom students tended to likewise outperform their Regular School counterparts, although not statistically significantly in every grading period. In a few circumstances the grades of the Project Homeroom students were, on average, somewhat lower than their Regular School counterparts.

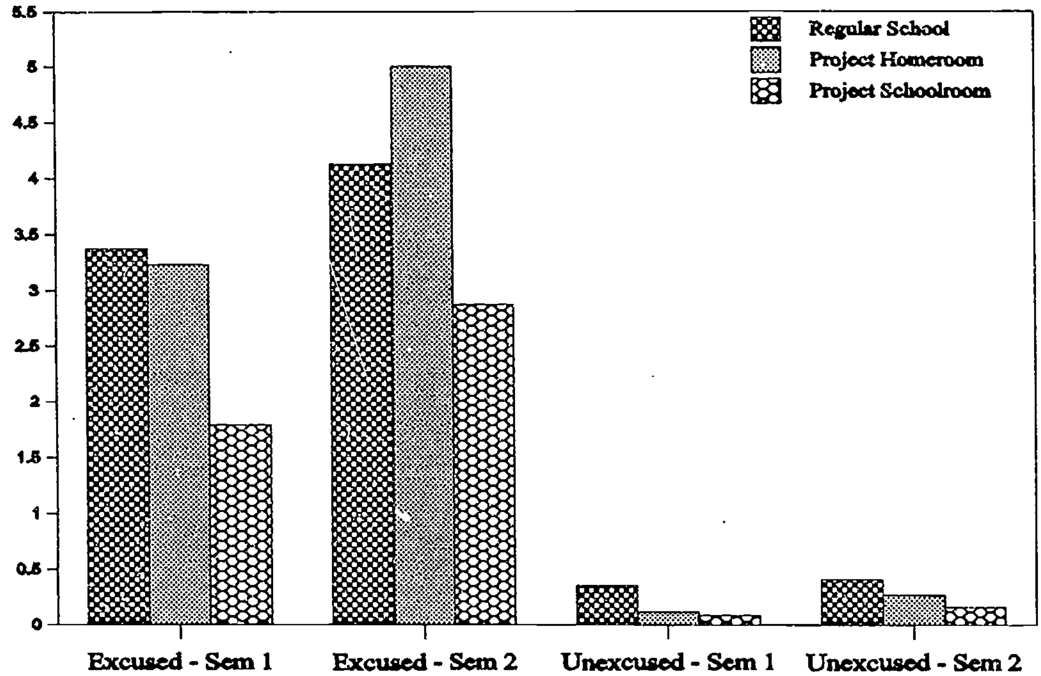
Cumulative grade point averages for the three groups (where all courses as well as high school courses taken before entry to Maine East were taken into account) showed the following percentage of student receiving a grade of C or better: 58.1% of the Regular School students; 55.6% of the Project Homeroom students; and 83.6% of the Project Schoolroom students. In the four subjects of Biology, Algebra I, World Cultures, and English, 49.6% of the Regular School students received a C or higher grade point average, 46.5% of the Project Homeroom students earned a C or higher grade point average, and 87.0% of the Schoolroom students earned a C or better grade point average. Project Schoolroom ($\bar{X} = 2.80$) students demonstrated a higher cumulative GPA over both Project Homeroom ($\bar{X} = 2.24$) and Regular School ($\bar{X} = 2.41$) students at the end of this 1993-1994 school year ($F = 3.69$, $df = 2,589$, $p = .026$). Although the Regular School students had a higher average GPA than those students in Project Homeroom, this difference was not statistically significant. When considering the grade point average of only the four core courses that were a part of this study Project Schoolroom ($\bar{X} = 2.76$) students achieved at a statistically significantly higher level than both Project Homeroom ($\bar{X} = 2.02$) students those students in Regular School ($\bar{X} = 2.27$) students, with the Project Homeroom average again not being statistically significantly different than the Regular School group average (see Figure 9).

Figure 9: Grade Point Averages



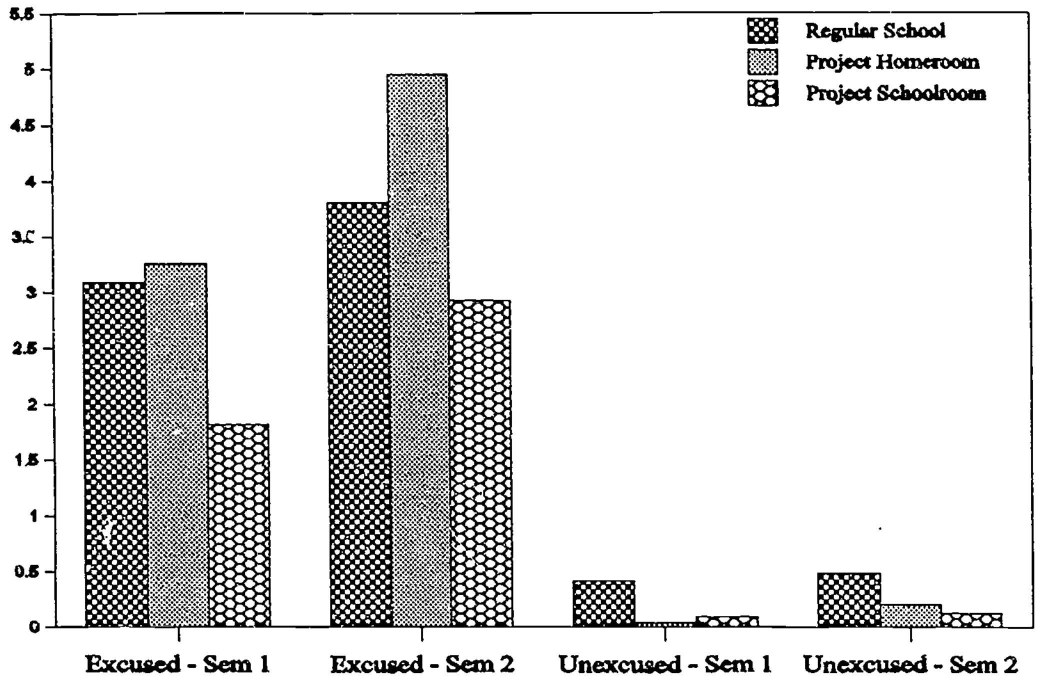
The number of class periods absent was also examined for students taking each of the four subject classes: English I (Figure 10), World Cultures (Figure 11), Algebra I (Figure 12), and Biology (Figure 13)). Absences were classified as either excused or unexcused, and were totaled separately for the first and second semesters. Analysis of Variance was used to determine if significant differences existed between the Regular School, Project Homeroom, and Project Schoolroom students groups.

Figure 10: Average Excused and Unexcused Absences - English



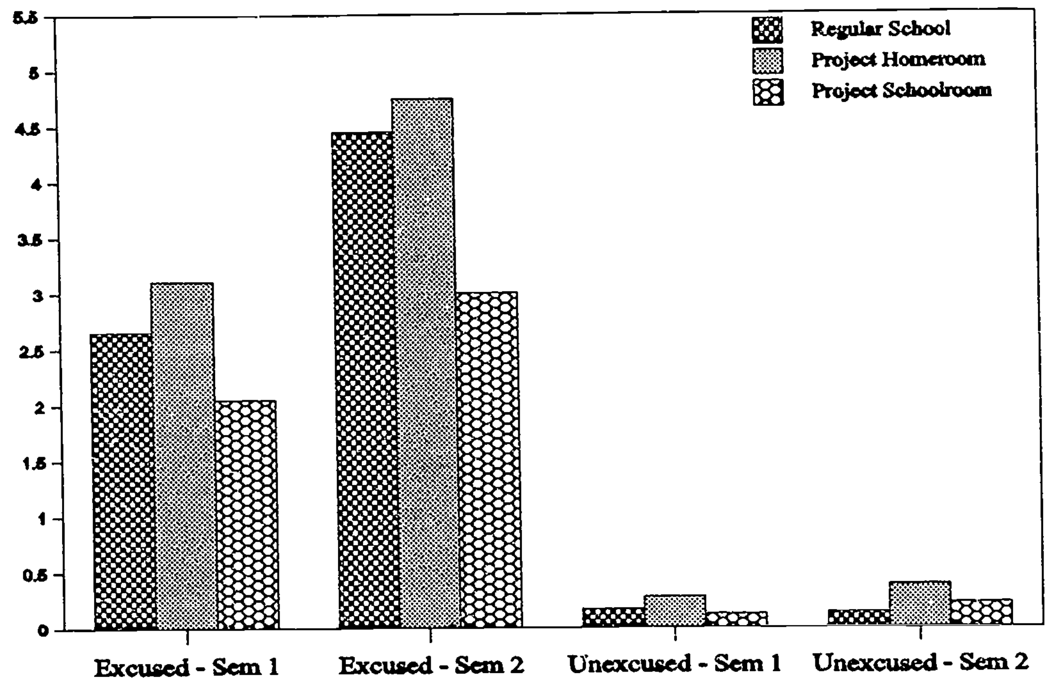
Project Schoolroom students demonstrated statistically significantly fewer excused absences from English I during the first semester ($\overline{X}$ = 1.79) when compared with both Project Homeroom students ($\overline{X}$ = 3.23) and Regular School students ($\overline{X}$ = 3.37). There was no statistical difference between the first semester average excused absence rates of Project Homeroom and Regular School groups (F = 3.10, df = 2,307, p = .0464). The second semester showed the same trend for the rate of excused absences: Project Schoolroom ($\overline{X}$ = 2.87), Project Homeroom ($\overline{X}$ = 5.00), and Regular School ($\overline{X}$ = 4.13). This time, however, the differences were not sufficiently large enough to be considered statistically significantly different from each other (F = 2.34, df = 2,300, p = .098). Unexcused absences in both the first and second semester for English I were extremely few in number, for the first semester averaging only .09 for the Project Schoolroom group, .13 for Project Homeroom, and .36 for Regular School. This difference was not statistically significant (F = 1.22, df = 2,307, p = .2958). Second semester average unexcused absences were likewise small: .16 for Project Schoolroom, .27 for Project Homeroom, and .41 for Regular School. Again, these differences were not sufficiently large to be considered statistically significant (F = 1.54, df = 2,300, p = .2167).

Figure 11: Average Excused and Unexcused Absences - World Cultures



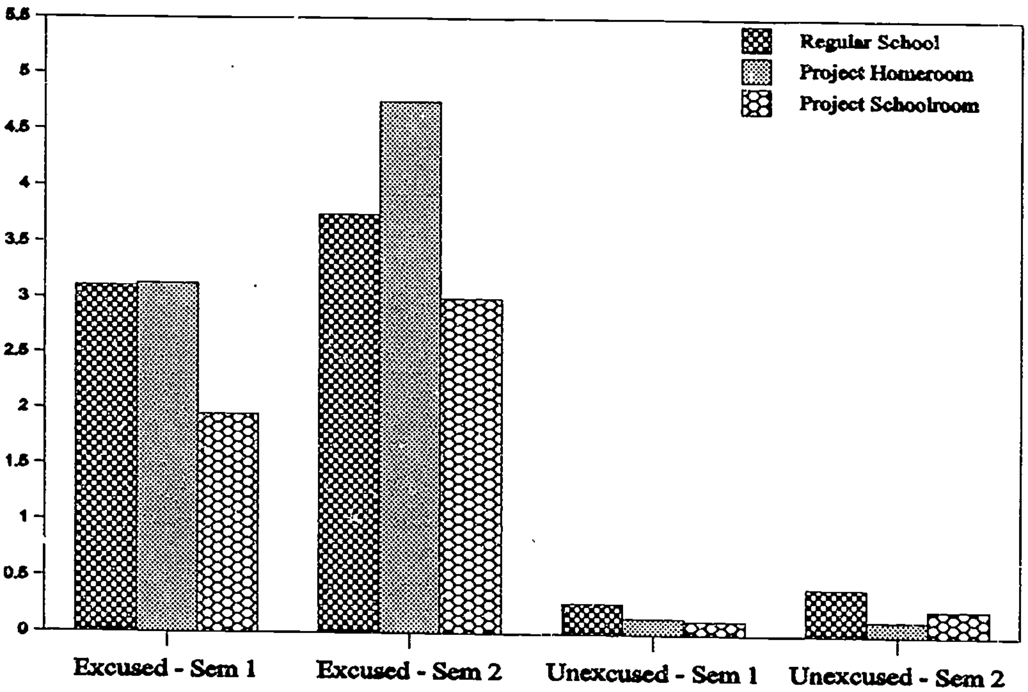
Average excused and unexcused absences for the World Cultures classes followed a pattern very similar to that reported for the English I class, with the Project Schoolroom students having, on average, fewer absences of either kind than their Project Homeroom or Regular School counterparts. Project Schoolroom students in the first semester only averaged 1.82 absences while Project Homeroom students averaged 3.26 and Regular School averaged 3.09. This difference was not, however, statistically significant (F = 1.86, df = 2,193, p = .1582). The same pattern was repeated in the second semester of excused absences: Project Schoolroom ($\overline{X}$ = 2.93), Project Homeroom ($\overline{X}$ = 4.95), and Regular School ($\overline{X}$ = 3.81). Again, this difference was not statistically significant (F = 1.75, df = 2,184, p = .1766). Unexcused absences were generally quite low. In the first semester Project Schoolroom students averaged .09 while Project Homeroom students averaged .04 and Regular School students averaged .42 (not a statistically significant difference, F = 1.25, df = 2,193, p = .2895). Although somewhat higher in the second semester these unexcused absences again remained quite low: Project Schoolroom ($\overline{X}$ = .13), Project Homeroom ($\overline{X}$ = .20), and Regular School ($\overline{X}$ = .49). Again, this difference was not statistically significant (F = 2.60, df = 2,184, p = .0768).

Figure 12: Average Excused and Unexcused Absences - Algebra I



Students in Algebra I were examined for their excused and unexcused absences. As before, the students in Project Schoolroom tended to have the lowest number of average absences. In the first semester the average number of excused absences were: Project Schoolroom ($\bar{X}$ = 2.05), Project Homeroom ($\bar{X}$ = 3.11), and Regular School ($\bar{X}$ = 2.66). This difference was not statistically significant (F = 1.26, df = 2,193, p = .2846). In the second semester the number of excused absences in Algebra I were: Project Schoolroom ($\bar{X}$ = 3.00), Project Homeroom ($\bar{X}$ = 4.75), and Regular School ($\bar{X}$ = 4.45). Again, this difference was not large enough for statistical significance (F = .72, df = 2,162, p = .4864). Unexcused absences in the Algebra I classes during the first semester revealed a similar pattern: Project Schoolroom ($\bar{X}$ = .13), Project Homeroom ($\bar{X}$ = .28), and Regular School ($\bar{X}$ = .17). These average unexcused absences were not statistically different from each other (F = .79, df = 2,193, p = .4559). In the second semester the average number of unexcused absences tended to rise slightly, with Project Schoolroom students having an average of .22, Project Homeroom an average of .39, and Regular School and average of .14. As before, though, these differences were not statistically significant (F = 1.54, df = 2,162, p = .2181).

Figure 13: Average Excused and Unexcused Absences - Biology



Excused absences for students taking Biology were tallied, and they revealed a pattern very similar to that shown for the other subjects. In the first semester Project Schoolroom students had, on average, few excused absences ($\overline{X}$ = 1.95) than both their Project Homeroom ($\overline{X}$ = 3.13) and Regular School ($\overline{X}$ = 3.11) counterparts. This difference, though, was not statistically significant (F = 2.01, df = 2,340, p = .1351). Second semester excused absences followed the same pattern: Project Schoolroom ($\overline{X}$ = 3.00), Project Homeroom ($\overline{X}$ = 4.75), and Regular School ($\overline{X}$ = 3.75). Again, however, this difference was not statistically significant (F = 1.66, df = 2,328, p = .1917). The average number of unexcused absences in the Biology classes, as in the other subjects, tended to be quite low. In the first semester Project School students averaged .13 while Project Homeroom students averaged .15 and Regular School students averaged .28 (not statistically significantly different, f = .49, df = 2,340, p = .6144). Second semester unexcused absences rose slightly, yet remained quite low: Project Schoolroom ($\overline{X}$ = .24), Project Homeroom ($\overline{X}$ = 14), and Regular School ($\overline{X}$ = .42). Again, this difference was not large enough to be considered statistically significant (F = .95, df = 2,328, p = .3870).

We also considered the total number of days absent according to the State formula for determining an absent day. Project Schoolroom students were absent, on average, fewer days than their Project Homeroom or Regular School counterparts ($\overline{X}$ = 2.97 versus $\overline{X}$ = 4.92 and $\overline{X}$ = 5.11, respectively). These differences, however, were not large enough to be considered statistically significant.

9. All students will demonstrate critical thinking, problem-solving, and cooperative learning skills as evidenced by student performance of at least 75% on a group research project.

Students engaged in several research-oriented projects throughout this second semester (Spring, 1994). Provided evidence of these research-oriented projects indicated components of critical thinking, problem solving, and cooperative learning activities to be engaged in by the participating students. Unfortunately, no specific scores were given to this evaluation team indicating either individual or group performance on any specific one of the undertaken projects. Therefore, we are unable to comment on the intended goal of 75% achievement since no measured data capable of being evaluated as a percentile were provided.

10. All students will demonstrate a respect for equipment, the work of others, and the ethical consideration of technology as evidenced by:

- **A. The crashing of the network no more than 5 days during the year.**
- **B. Fewer than 5 attempts to misuse the network server.**
- **C. Less than 10% of students' hard drives requiring re-installation of programs.**

Students seemed to reach this outcome quite easily. Brad Waggoner indicated that there have been very few problems with both the network and individual computers, other than the difficulties surrounding the implementation of a BBS tracking program. Brad further reported to this research team that the network crashed fewer than 5 times during the year (due to student-induced problems), and that fewer than 4% of the students' hard drives required software reinstallation of any kind.

District Goals: Teacher Outcomes

1. Teachers will collaborate and share with other team members during a common scheduled planning period.

Interviews with participating teachers revealed that they felt collaboration and sharing among themselves was the most beneficial component in both Project Homeroom and Project Schoolroom. All teachers spoke positively of the team approach, citing several direct benefits including fewer discipline problems than in the past and an ability to spend more time counselling with students. One teacher reported that he spent more than 50% of his day working with individual students. This sentiment was echoed by the other teachers in both groups. All agreed that the teaming aspect allowed them to be more effective in their "counselor function" as teachers. Another teacher considered the team approach a support system for teachers as well as students, since academic and personal feedback were both faster and more frequent. Because of teacher teaming, the teachers reported being able to intervene sooner when problems arose, and students felt comfortable consulting all teachers about all subjects rather than consulting specific teachers regarding the specific subjects they taught. Teachers reported instances of students continually mixing up teacher names. They interpreted the mixing of names to indicate a feeling on the part of the students that the teachers were truly interchangeable; that talking to one was as good as talking to all. This blurring of group member identities carried over into the curriculum itself. Teachers in both Project Homeroom and Project Schoolroom reported that the working environment encouraged them to give up guarding their individual academic "turf", and to think about education as integrating separate parts of a unified whole.

As the year progressed, however, it appeared from teacher reports that teachers became less team oriented and began to fall back into the seclusion of their individual disciplines. Teachers from both groups reported an increasing feeling of competition between Project Homeroom and Project Schoolroom. They attributed this feeling to their perceived heavy emphasis upon doing well on the end of semester CRTs. One veteran of the original Project Homeroom study remarked, "We were competing with each other this year... I didn't feel it that much in the past." The teachers especially felt that publicizing the CRT scores in the newspaper at the end of the first semester added to the tension and perceived competition between the two project staffs. The teachers in both groups indicated that they felt like they "burned-out" during the second semester and that, to some extent, teaming exacerbated that decline. Emotions seemed to carry across members of the teams. If one member came in feeling down, that feeling rapidly spread to the others. While the reverse also seems true: happy members "picking-up" the collective feeling of the group, the former condition was reported to have occurred more frequently for reasons readily and not so readily apparent.

2. Teachers will create two interdisciplinary projects as documented by unit plans.

Project Homeroom and Project Schoolroom students worked together with each other in several different classes. One project allowed students to create Linkway biographies of one another, using computer skills to develop an electronic biography accessible by all. This computer "folder" included digitized photographs with linked textual biographies of personal information. Another ongoing project allowed students to create a database of book reviews that would then be accessible to everyone. There was even a Linkway presentation (created in part by a former Project Homeroom student) to introduce these students to the computer and its peripherals. Nonetheless, the veteran Project Homeroom teachers working in both projects, when asked to compare students' work, saw really no difference in the quality of that work.

In Biology, lab reports were reportedly more legible and neat when completed using a computer. Yet the quality of those reports were not seen as any better or worse because of the technology. The teachers in both groups were convinced that while the quality of the outputs may have been marginal between groups, the quality of the experiences were significantly affected. In English, students using computers were seen as having become more aware that they were writing for an audience. In Math, students were able to experiment with different order equations. Using the computer students were able to graph equations, change parameters and immediately see the differences there changes made in the graphs. Math students not using the computers did not approach this exercise until much later in the semester and did their graphing by hand, thus spreading out the time it takes and the time between intuitive connections.

While Project Homeroom and Project Schoolroom created these, and other, opportunities for students to work collaboratively, the majority of the attempts at interdisciplinary teaching in both groups have been along the lines of creating activities that maximize parallels already existing in established curriculum. Such activities were often spontaneous or implemented with minimal planning. Once again, the teachers in both groups reported spending large amounts of their available time engaged in more traditional instruction and in teaching content that is specifically sampled on the CRT. During team planning meetings, "We decided that if we didn't have business to discuss, we went and did our own things." In this context, "business to discuss" usually referred to administrative tasks and tasks related to the aforementioned "counselor function". Similarly, "doing our own things" referred most often to each teacher's academic discipline specific tasks.

Two large scale interdisciplinary units were attempted primarily in Project Schoolroom during the Spring semester 1994. During the first quarter, students examined the concepts of "Love and Hate". During the second quarter they examined issues relevant to "2001 - Our Generation." Both of these project themes began with students generating multiple topics of concern to them and then grouping these topics into much larger themes. The students then explored these themes in their individual classes utilizing each particular discipline as a lens through which to view the theme. For instance, in the "Love and Hate" unit students read Romeo and Juliet to gain the literary perspective on conflict. This was followed up with discussions and examples of conflict in society and the natural world. In the second quarter, the film version of Romeo and Juliet was viewed and in exploring "2001 - Our Generation" the students began to come to grips with the idea that it doesn't really matter so much when you live as it does where you live. Romeo and Juliet was selected as being especially pertinent for Maine East students, some of whom may actually face an arranged marriage in their future.

3. Teachers will communicate with parents and/or students at the rate of at least 5 personal communications per week as evidenced by the electronic bulletin board.

As previously mentioned technical difficulties prevented the direct collection of data from the bulletin board system. Interviews with teachers indicated that at least this level of communication was occurring, although more so with students than their parents.

District Goals: Institutional Outcomes

1. Project Homeroom will identify successful instructional practices and share them with District 207 faculty through scheduled in-service sessions.

Interviews with participating teachers reveal that in-service sessions had been scheduled and conducted. One such session was conducted on January 21, 1994 at the Sharing the Wealth: Innovative Practices in Instruction and Assessment institute. Teachers in both Project Homeroom and Project Schoolroom shared their experiences with the rest of the Maine East faculty in a workshop entitled "Interdisciplinary Education at Maine East". Thirty faculty members attended the session.

The teachers in both groups reported spending a large part of their time during the Spring semester engaged in drafting the proposal to create a program for next year based upon their experiences with Project Homeroom/Project Schoolroom this year. Foremost among their suggestions for next year is to change the evaluation from the established CRTs to a more authentic assessment. The teachers all described in detail how the current CRTs are outdated and do not adequately reflect the innovations present in both Project Homeroom and Project Schoolroom. They describe the current CRTs as having been written by other staffs more than eight years ago and reflect curricula that are no longer even being taught. To quote one of the Project Homeroom teachers, "Staffs have changed, things have changed, approaches have changed, but the CRT has remained the same. It's never been refined". For all of their discussion of the inadequacies of the current CRT, they then went on to describe the evaluation for next year which they admit sounds like a revised CRT. Accordingly, this revised assessment will come from the traditional curricula c. 1994 and will still be inadequate to assess the impact of teacher teaming, the integration of technology with curriculum, and interdisciplinary instruction.

The veteran Project Homeroom teachers expressed feeling "burnt out" at the end of this school year. They said that they felt like they had been in an "experimental mode" for nearly four years, that they seemed to be "still pioneering" and expressed the desire to just stop and take stock of the innovations attempted over that period. Most of all they wished for the opportunity to review and re-implement some of those innovations.

2. Project Homeroom will demonstrate a mutually beneficial relationship with its business partners as documented by correspondence, minutes of meetings, and an annual report.

The Illinois State University evaluation team was not charged with measuring this outcome item.

District Goal: Education Committee, Board of Education, Outcomes

1. Contrast regular freshman students with students participating in Project Schoolroom and Project Homeroom to determine the separate impacts of computer technology from teacher teaming from interdisciplinary education.

Several problems occur when attempting to measure the impact of technology, teacher teaming, and interdisciplinary instruction in a real school setting. In this case while the Project Homeroom teachers were responsible for creating an interdisciplinary curriculum, and for using computer technology in their classes, the criterion referenced tests they had to administer did not, they felt, fully reflect the goals of this expanded curriculum. There was a realization that the CRTs were written for traditional classes taught in traditional ways, and did not reflect what would be taught in a truly technology-enriched, interdisciplinary environment. While this changed somewhat in the end of the year CRT through the addition of specific questions for each group and class, the participating teachers reflected that these questions were an addition not a substitution. They reported that they felt little to no concession of curricular breadth to accommodate the depth of learning that could be encouraged through Project Homeroom, especially in term of using the computers. While teachers recognized places within their subject matter where the students' understanding could be enhanced by using a computer application, they felt constrained by the demands that they cover all the curricular mandated and CRT examined information in each course. Given the depth of the traditional coverage, there was little time or incentive to integrate the use of the computers to their fullest capacity since the entire existing curriculum needed to be learned by the students if they were to do well on the "standard" portion of the CRT.

Other structural problems inhibited the proliferation of both interdisciplinary practice and computer use across both Project Homeroom and Project Schoolroom. Scheduling of computer facilities for the teachers in Project Schoolroom had to be done months in advance, unlike their Project Homeroom counterparts who had easy access. Given the ongoing planning and the theoretically fluid nature of the developing curriculum, they felt it was next to impossible to determine so far in advance when they would use the computers in a truly integrated and fruitful way. Rigid departmental expectations made interdisciplinary and computer work difficult for the math teachers. Also, the math teachers expressed frustration about having the students who failed the first semester in the same classes as students who did not fail. They had to reteach the first of the class to the few students at the same time as they taught the second portion of the class to the rest of their students. This requirement to teach two classes at the same time further inhibited their ability to create interdisciplinary ties and to use computers effectively. Non-math teac rs in both groups felt constrained by the expectations of the math department. All teachers felt constrained by the lack of congruence between the CRTs and the new curriculum they were developing.

Summary

The 1993-1994 student of Project Homeroom, Project Schoolroom and Regular School at the Maine East High School has demonstrated a number of interesting results. Major findings given in this report include:

- Demographic and prior achievement levels of students in the Project Homeroom, Project Schoolroom, and Regular School groups varied little. What statistically significant prior differences that did exist accounted for just a small percentage of the variability in achievement (as measured by grades, criterion referenced tests, and rates of excused and unexcused absence).

- Students in the Project Schoolroom group tended to achieve statistically significantly higher grades than the students in the Project Homeroom group and the students in the Regular School group in each of the four subject areas of considered. Project Homeroom students achieved at a level similar to or somewhat higher than the Regular School students, although almost consistently less than that of the students in Project Schoolroom.

- Project Schoolroom students tended to be absent less, both excused and unexcused, than both their Project Homeroom and Regular School group counterparts.

- Teacher teaming provided direct benefits to both teachers and students. Teachers were better able to coordinate instruction, plan and conduct interdisciplinary units, and intercede with students questions and problems. Students felt more connected and in touch with their teachers and the different subjects.

- Participating teachers found it difficult to integrate computer technology, and plan long-term interdisciplinary units, into the curriculum given the current constraints of standard curriculum and CRT assessment. The need for easy and frequent accessibility to computer equipment, reducing the constraints on modifying standard curriculum, preparing students to achieve on standardized tests that include components of using the computer and/or interdisciplinary learning as standard components rather than add-ons, and a limited amount of time in which to incorporate changes were all reasons cited. Re-considering standard curricula, content, and means of assessment would could allow for an easier and more pervasive inclusion of both computer technology and interdisciplinary units into day-to-day classroom activities.

When asked to supply suggestion to other schools attempting these types of innovations, the Project Homeroom and Project Schoolroom teams came up with four general statements:

1. **Get your curriculum straight first** - Know what it is you are going to teach well before teaching it. Then approach an interdisciplinary curriculum through smaller parallel discipline and multi-disciplinary exercises.

2. **Get consistent from year to year** - Establish a team that is to work together and then leave it intact from year to year. The teachers from both groups attributed many of their team-related problems to learning to work with new people, teaching styles, and curricula. "Now that we've lived with each other for a year we understand better where links [in curriculum] occur."

3. **Get the goals up front** - Get the administration to tell you the goals of the project and how it is to be evaluated first. Have teacher understanding of, and support for, these goals before the project is undertaken. Do not change the goals mid-year unless everyone - teachers and administrators - agrees that the change is necessary. This is especially true for the method of assessment used to determine goal achievement.

4. **Provide incentive** - Each member of the team has to have some reinforcement for engaging in innovation. Whether that incentive is the safety to make mistakes without fear of reprisal or just out and out money is entirely subjective and must be ascertained for each member of the team.

These results strongly suggest that, by allowing teachers the flexibility to work and plan together to meet the needs of large groups of students engaging in activities that cross traditional disciplinary lines, teacher teaming can be the first step towards school improvement. This study also points to the need for technology to become an inclusive part of regular instruction and assessment, rather than an added feature, if it is to be valued and invested by both student and teacher. While change is never quick nor easy, this research team commends the faculty, administration, and students of the Maine East High School for the earnest efforts to self-examine and improve. The experiences of Project Homeroom and Project Schoolroom serve as a model for continuing innovation, reflection, and research into new methods to create an academically challenging socially rewarding school environment.

References

Becker, H. J. (1987). The effects of computer use on children's learning: Limitations on past research and a working model for new research. Peabody Journal of Education, 64(1), 81-110.

Boyer, E. (1985). High school. New York: Harper & Row.

Brophy, J., & Hannon, P. (1984). The future of microcomputers in the classroom. Occasional Paper No. 76, Institute for Research on Teaching, Michigan State University.

Carnegie Task Force on Teaching as a Profession. (1986). A nation prepared: Teachers for the twenty-first century. New York: Carnegie Forum on Education and the Economy.

Cohen, E. G. (1981). Sociology looks at team teaching. Research in Sociology of Education and Socialization, 2, 163-193.

Coppock, N., & Hale, N. (1977). Middle schools. School Management Digest, Series 1, (4). Burlingame, CA: Association of California School Administrators.

Costello, R. W. (1991). Improving student achievement by overcoming teacher isolation. Clearing House. 61(2), 91-93.

Cotton, K. (1982). Effects of interdisciplinary team teaching. Research Synthesis presented to Bolton Middle School, West Linn, Oregon. (ERIC Document Reproduction No. ED 230 533)

Cuban, L. (1986). Teachers and machines: The classroom use of technology since 1920. New York: Columbia Teachers College Press.

Holmes Group. (1986). Tomorrow's teacher: A report of the Holmes Group. East Lansing, MI: Author.

Jacobs, H. H. (1989). Interdisciplinary curriculum: Design and implementation. Virginia: Association for Supervision and Curriculum Development.

Kosma, R. B., & Croninger, R. G. (1992). Technology and the fate of at-risk students. Education and Urban Society, 24(4), 440-453.

Little, J. W. (1982). Norms of collegiality and experimentation: Workplace conditions for school success. American Educational Research Journal, 19(3), 325-340.

Meichtry, Y. J. (1990). Teacher collaboration: The effects of interdisciplinary teaming on teacher interactions and classroom practices. Paper presented at the Annual Meeting of the Mid-Western Educational Research Association, Chicago, IL.(ERIC Document Reproduction No. ED 326 499)

National Commission on Excellence in Education. (1983). A nation at risk: The imperative for educational reform. Washington, D.C.: U.S. Department of Education.

Riel, M. (1989). The impact of computers in classrooms. Journal of Research on Computing in Education, 22(2), 180-190.

Rockman, S. (1993). Asking the right questions. The American School Board Journal, 29-31.

Schmuck, R. A., & Runkel, P. J. (1985). The handbook of organization development in schools. Palo Alto, CA: Mayfield Publishing Company.

Scholz, R.W. (1978). What research has found out on the cooperation of teachers and the effect of team teaching. West Germany. (ERIC Document Reproduction Service No. ED 173 154)

Shaplin, J. T. (1964). Team teaching. New York: Harper and Row.

Task Force on Federal Elementary and Secondary Education Policy. (1983). Making the grade. New York: The Fund.

Whitford, B. L., & Kyle, D. W. (1984). Interdisciplinary teaming: Initiating change in a middle school. Paper presented at the Annual Meeting of the American Educational Research Association, New Orleans, LA. (ERIC Document Reproduction Service No. ED 263 672)