Making Effective Use of Interdisciplinary Teaming, Active Learning, and Instructional Technology in Middle School Classrooms

Research Overview

Project TEAMS was modeled after a successful technology-infused elementary school program called Project CHILD (Computers Helping Instruction and Learning Development) which had been developed at Florida State University in the 1980's (Butzin, 1997). Project CHILD is a research-based instructional delivery system that increases student achievement by optimizing student on-task engagement using a multi-sensory active learning station approach.

In 1993, the John S. and James L. Knight Foundation provided funding to researchers at Florida State University to adapt the CHILD model for middle level students. Initially, the research project was staffed by an interdisciplinary team of four sixth grade teachers from a low performing middle school in Tallahassee, Florida, two university researchers, and a former teacher with 18 years of middle school experience who served as project manager.

During the first half of 1993, the TEAMS staff of teachers and researchers planned an instructional approach centered around three precepts; 1) interdisciplinary teaming, 2) hands-on active learning, and 3) the integration of instructional technology. Using those percepts as guide posts, over the next two years the project staff designed an entire sixth grade instructional program in the areas of mathematics, science, social studies, and language arts. The program consisted of a series of detailed suggestions for small group activities and whole group lessons that teachers could employ in conjunction with existing text materials, a wide variety of existing software programs, and other mediated instructional materials.

In the 1995-96 school year, the TEAMS program was piloted at the sixth grade level at the Tallahassee middle school where it had been developed, with formative evaluation data collected through observations, surveys and interviews. Subsequently the TEAMS model and accompanying TEAMS materials were revised and expanded to the seventh grade level, providing a fully developed set of instructional materials and a training process to enable teachers to implement the TEAMS model effectively.

In 1996-97 the pilot was expanded to one additional low performing middle school in Tallahassee, and a third under performing middle schools in Perry, Florida. The original pilot school in Tallahassee implemented at both sixth and seventh grade levels, as did the school in Perry. The third school in Tallahassee implemented in only sixth grade. A summative evaluation was planned to analyze standardized academic achievement data in addition to qualitative data analysis.

Theoretical underpinnings

Interdisciplinary instructional teams consist of two or more teachers who share a common group of students, a particular area of the school building, and a common planning time during which they work together in planning their instructional activities (Erb, 1997; Stevenson & Erb, 1998). Although interdisciplinary teams had existed at the middle school level for more than 30 years, the use of such teams became much more prevalent after the Carnegie Council on Adolescent Development authored Turning Points (1989). One of the major recommendations put forth by the Council was that teachers and students should be organized into teams that work together to help students achieve academic and personal goals.

Studies examining the effects of teaming have indicated that this approach has had a positive effect on teachers' feelings of efficacy and their professional images. Moreover, teaming has had a positive effect on students' self-esteem, their attitudes toward learning, and their performance on standardized tests in mathematics, language arts, and reading (Erb, 1997; Stevenson & Erb, 1998).

Active learning is the second key precept underlying the TEAMS approach. In contrast to the traditional lecture/discussion approach where students often are expected to be passive recipients of information conveyed to them by the teacher, active learning strategies require students to engage in "hands-on" learning activities.

As indicated in Turning Points, these activities are often designed to help students discover or construct knowledge for themselves and/or allow students to create novel solutions to problems. In other cases, active learning activities provide students with opportunities to practice applying the skills they are in the process of learning. As pointed out in several reports of National Standards, such activities help students to become active independent learners (National Research Council, 1996; Wilhelm, 1996; Kendall & Marzano, 1995).

Active learning activities often involve having students work cooperatively in small groups. By doing so, students have the opportunity to discuss and evaluate the ideas expressed by their teammates as well as share their insights with, and react to, feedback from their peers (Carnegie Council on Adolescent Development, 1989). These activities help students develop critical thinking skills and reflect upon the opinions of their peers, a group whose influence is particularly strong at this stage in their development. Thus cooperative learning activities help middle school students meet their learning, social, and emotional needs (Wood & Jones, 1994, 1997).

Frequent use of technology as an instructional tool is the third precept underlying the TEAMS approach. Many articles describing the effective use of technology in middle school classrooms have been published (Blasewitz & Taylor, 1999; Gilstrap, 1997; Windschitl & Irby, 1999). These articles, as well as several of the reports on National Standards (National Research Council, 1996; Wilhelm, 1996; Kendall & Marzano, 1995), describe how the classroom use of technology supports active student learning, especially independent inquiry. There have also been many reports of cases where technology has been used successfully with small groups of learners engaged in active learning as members of cooperative teams (e.g., Cavalier & Klein, 1998; Hooper, Temiyakarn, & Williams, 1993).

A brief description of the TEAMS model

TEAMS organizes the curriculum around four overarching nine-week thematic units. In each unit the subject areas of science, mathematics, social studies, and language arts are tied together around one of four themes related to the concerns and needs of middle school students. For example, at the sixth grade level, the four unit themes are Transitions, Caring, Identities, and Conflict Resolution.

During each TEAMS unit, students work through several instructional "rotations." Each rotation starts with one or two whole group activities, followed by a set of four to six small group activities, followed by a whole group activity designed to bring closure to the rotation. TEAMS materials provide detailed suggestions for each of these activities, but the four teachers (one from each major subject area) who comprise an instructional team are encouraged to use their common planning time to review and revise these activities and plan others that might be better suited to meet the needs of their team of students.

In each subject area, a typical TEAMS rotation extends over a period of approximately two weeks. The first one to three days of the rotation consists of whole group instruction. During this time the teacher and students may be discussing the knowledge or skills that students will focus upon during that rotation and/or the teacher may be providing direct instruction on specific skills the students are expected to learn.

During the next four to six days, the students work in small groups at various learning "stations" in the classroom. During this time, the students are engaged in a wide variety of instructional activities. For example, they may be constructing their own knowledge base in a content that is new to them and/or they may be practicing a specific set of skills they are expected to acquire. Small groups of students (usually four to six) rotate from station to station on a daily basis until all of the groups have engaged in the activities at all of the stations. After engaging in all of the small group activities, the class meets together as a whole group for one or two days, reviewing and discussing what they learned and/or practiced at the various stations.

Each rotation also includes one or more assessments of student learning. Suggested assessment techniques range from closed book written tests to teacher and/or student assessments of a product or products students produced while working at one or more stations.

There are at least four learning stations set up for each rotation.. There is a Technology Station for computer-based learning, an Exploration Station I for creative activities involving student-generated products, an Exploration Station II for learning in a game-like format, and a Text Station for written work. For example, a language arts rotation designed to help students identify the main ideas in a passage includes the following station activities, each of which is designed to be undertaken by several pairs of students working together on the task:

• a technology station activity where students use a piece of software that puts them in the role of newspaper reporters identifying the main ideas in, and writing headlines for, given newspaper stories;

• an exploration station activity where students create telegrams that summarize key ideas that they must transmit to other students;

• a second exploration station activity where students participate in a game in which they must identify whether given sentence strips describe a main idea or provide supporting details; and

• a text station activity where students read text passages from their science and geography texts and identify the main idea in each passage.

The activity that students will undertake at a particular station is described, in simple language, on a "task card" located at that station. Although teachers are free to create their own station activities and task cards, the TEAMS model provides teachers with many suggestions for station activities. For example, at the sixth grade level the program materials include over 40 sample task cards in each of the four major subject areas.

Station activities provide students with the opportunity to be self-directed, active learners, either working independently or cooperatively in small groups. Prior to the day students begin their station work, the teacher will typically provide a quick overview of the activities that will take place at each station. The following day, at the beginning of the class period, group members examine a wall chart to determine which station their group will be working at on that day. The group members then proceed to that station, where they read the task card that describes the station activity. The group members then organize the group so that they can work together, or independently, to accomplish the task described on the card. Sometimes the group will decide upon individual roles and responsibilities. In other cases, designation of roles and responsibilities may be decided upon by a team captain (a title that rotates among group members on a regular basis).

During station work, the teacher shifts to the role of coach and facilitator. While the students work at station activities, the teacher circulates around the room, guiding, probing, checking, and encouraging students as needed. In addition, the teacher may sometimes set up a Teacher Station, where the teacher can work with a small group of students who may need extra attention.

Relationship between the TEAMS Implementation and Its Underlying Precepts

The employment of interdisciplinary instructional teams was supported in several ways during the pilot years. Each team of four teachers had a common planning time, shared a common pool of students, and were housed in adjoining classrooms within the school building. Moreover, prior to their first year of implementing the TEAMS approach, each team of teachers attended a summer planning workshop where they learned about the TEAMS approach and began identifying skills and knowledge that were related across subject areas. In several instances, such workshops resulted in teachers implementing a simple re-sequencing of required coursework so as to highlight connections across subject areas. For example, the sixth grade science and social studies (geography) teachers at one school decided to coordinate their study of weather and weather mapping, and the mathematics teacher offered to have the students work on the calculations necessary for weather reporting during this same time period.

In addition to identifying logical connections across subject areas, TEAMS teachers were also encouraged to identify how their subject matter related to the overarching themes of each nine-week unit in the TEAMS curriculum. As mentioned earlier, these themes were based on the personal concerns of middle school children and dealt with such areas as conflict resolution and identities. By focusing on these overarching themes, students could better identify the relationships across subject areas, as well as identify how that subject area may be relevant to

their everyday concerns. The TEAMS materials also provided weekly personal development activities to use during non-academic home room time for further reflection on the unit theme.

Active learning, the second key precept of the TEAMS approach, was supported by the extensive use of station activities. Unlike traditional classrooms, where most of the instruction involves the teacher leading the entire class in lecture and discussion sessions, under the TEAMS approach a larger percentage of the instructional time was devoted to having students working independently or in small groups at the various learning stations described earlier. Teachers and students reported that this was one of the most positive features of the TEAMS approach and resulted in students being on task to a greater extent than when they were receiving whole group instruction.

Frequent use of technology as an instructional tool is the third precept underlying the TEAMS approach. Students were engaged in a computer-based activity at the technology station during every rotation. In addition, other forms of instructional technology, such as the Jasper Woodbury videodiscs series (Cognition and Technology Group at Vanderbilt, 1993), were often employed at an additional technology station in some TEAMS classrooms.

To help teachers select appropriate software, the TEAMS staff reviewed software provided by numerous publishers and identified software programs that supported the acquisition of most of the skills taught in the curriculum. In those cases where existing software was not available, teachers used the Internet, spreadsheets, word processing programs, and databases to provide students with technology-based practice activities.

The project developers believed that students and teachers were more likely to view technology as an integral part of the instructional process if that technology was situated in the classroom, rather than a media lab. Thus they worked with administrators to insure that at least four computers were located in each of the TEAMS classrooms. On occasion, this meant moving some computers out of labs or out of classrooms where they were not being used. In most cases, by having at least four computers in each TEAMS classroom, and by having students work in pairs at the technology station, all the students in a class are able to engage in a technology-based activity during each rotation.

Research Examining the Effects of the TEAMS Approach

Two preliminary reports examining the effects of the TEAMS pilot were prepared by researchers from Florida State University. The first (Riggin & Gill, 1997) focused on the effects of TEAMS at three schools during the 1995-96 school year. Most of the data came from interviews with the TEAMS teachers and students, as well as a written student survey. The second preliminary evaluation (Cooksy & Gill, 1997) focused on the effects of TEAMS at the three pilot schools during 1996-97.

It should be noted that implementation concerns beyond the control of the project staff led to an incomplete summative evaluation. For example, the original TEAMS pilot school experienced ongoing staff and student turnover through rezoning. Two teachers never implemented the TEAMS station concept and remained committed to whole group instruction. Technology breakdowns were a constant plague. Collegial planning and interdisciplinary instruction were not always in evidence as replacement teachers came on board in subsequent years. Some teachers did not use the *TEAMS Learning Activities Guides* to plan lessons and

station activities. Peer classroom observations were not done as classroom coverage became unavailable. Some teachers did not have students set goals and reflect on their station work using the *TEAMS Work Logs* as required. In short, it was difficult to demonstrate the full effects of the program when some of the essential components of the TEAMS model were sporadically implemented.

Test score data as well as discipline data were also difficult to obtain. One school reported that discipline data had been erased from the computer. Standardized test scores were originally reported in percentiles, which the evaluators pointed out are impossible to interpret for year-to-year changes. Fortunately, our project manager was able to obtain standard score data at one school, which did show that test scores showed a slight increase.

Despite these implementation issues, the survey data from students and teacher perceptions regarding the effects of TEAMS on academic achievement were quite positive. The standardized test score data showed mixed results.

1995-96 Evaluation Summary

The vast majority of students interviewed indicated they had learned more in sixth grade, under Project TEAMS, than they had learned in the previous school year. Approximately half of these students attributed these learning gains directly to the Project TEAMS approach. Moreover, all of the regular Project TEAMS teachers who were interviewed indicated that TEAMS was having a positive effect on student learning, although not necessarily in the areas being assessed on standardized achievement tests, where student percentile scores went down slightly from fifth grade to sixth grade.

Several teachers indicated that TEAMS had a positive effect on student behavior, stating that under the TEAMS approach their students were better disciplined and were more focused on their schoolwork. These perceptions were supported by the classroom observations conducted by the evaluation team, who reported very few behavior problems in the classes they observed.

Student attitudes toward school also seemed to improve as a result of Project TEAMS. The majority of students who were interviewed indicated that they liked school better and were less bored than previous years. Students were particularly positive about the station activities and computer-based instructional activities that are part of the TEAMS approach. The teachers who were interviewed also indicated that students were enthusiastic about TEAMS.

The results of interviews conducted with TEAMS students and teachers strongly supported the notion that TEAMS has improved the students' ability to work in groups. TEAMS students indicated that they were better able to work with and help other students, as well as learn from other students. Most of TEAMS teachers also supported this viewpoint, stating that students were not only better able to work in groups, but were also more tolerant of group members who were different than they were (with regard to such factors as ethnicity, gender, and ability).

Student organizational skills also seemed to have been positively affected by the TEAMS approach. All of the teachers interviewed indicated that student organizational skills seemed to have improved. The majority of student who were interviewed also stated that they were better able to keep their notebooks organized.

TEAMS also appeared to have had a positive effect on the self-directed learning skills of students. The majority of students who were interviewed stated that they were more likely to complete assignments and turn them in on time. Students also felt that the station activities gave them a sense of responsibility and independence. Indeed, a majority of the students stated that they were relying on their teachers less than they had been in previous years. Moreover, classroom observations revealed that students, upon entering a TEAMS classroom, would routinely, without any oral directions from the teacher, determine the station that they had been assigned to, go to that station, and begin doing the required work.

Finally, students also reported that their skills in using computers had improved. They attributed this outcome, in part, to the regular and equal access they had to computers as a result of Project TEAMS. The TEAMS teachers echoed this point of view.

A preliminary evaluation of standardized test scores was conducted at Taylor County Middle School in Perry, Florida where the evaluators had access to standard scale scores. This school also had the highest degree of faithful implementation of the TEAMS model components through the years. 199 students participated in the TEAMS program during the 1995-96 school year. A comparison of their test scores from 5th grade to 6th grade showed significant gains, especially in mathematics.

Year	Total Battery	Math	Language	Reading
1995 (5th grade)	635.6	637.5	640.0	640.0
1996 (6th grade)	642.6 (.000sig)	659.4 (.000sig)	645.5 (.001sig)	646.6 (.000sig)

Further analysis of these students showed that 72 of the 199 6th grade TEAMS students who had come from Project CHILD 5th grade classrooms had even greater success in middle school. They entered 6th grade with test scores higher than their counterparts who had not had Project CHILD in elementary school, and they continued to show greater progress in most areas.

Year	Total Battery	Math	Language	Reading
1995 (with prior CHILD)	638.3	636.3	649.7	650.1
1995 (without CHILD)	632.8	636.7	642.9	639.1
1996 (with prior CHILD)	644.6	658.6	648.1	651.1
1996 (without CHILD)	641.0	660.1	643.7	643.0

1996-97 Evaluation Summary

Results from the 1996-97 evaluation showed positive attitudes based on survey and interview data. Learning gains were difficult to assess, showing mixed results.

• **Student Attitudes**: Most students reported that they had positive attitudes toward school and learning. Their teachers generally concurred.

• **Self-directed Learning Abilities**: Students rated themselves highly on several measures of self-directed learning that TEAMS attempts to foster (e.g., looking for information from sources other than the teacher, establishing individual learning goals, staying on task). Teachers at two of the three schools concurred with the students' opinions, while teachers at the third school were less positive.

• **Working in Groups:** Most students indicated that they liked working in small groups, found them useful, and felt they learned while working in them. Their teachers generally concurred.

• **Computer Skills:** Students gave themselves high ratings in computer skills, a set of skills that the TEAMS approach is designed to foster. The students' teachers generally concurred.

• **Learning:** At two of the three schools where the evaluation took place, improvements (from fifth grade to sixth grade) in the standardized test performance of TEAMS students were compared to improvements among students in a matched comparison group. Student scores on the overall test, as well as on the mathematics and language portions, were examined.

At the middle school where TEAMS has been in place the longest, TEAMS students improved their scores on the overall achievement test, as well as the mathematics portion, to a significantly greater extent than a matched comparison group from other schools in the same county. However, at a second middle school in its first year of implementation, the improvement in TEAMS students' scores in mathematics and on the overall test were significantly less than that of a group of non-TEAMS students at the same school.

Conclusion

These results are fairly consistent with findings from previous educational reform efforts. In many instances, after educational reforms are properly implemented, improvements in teacher and student attitudes precede improvements in student achievement (Erb & Stevenson, 1999; Stevenson & Erb, 1998). This appears to have been the case with the TEAMS pilot study. In all three pilot schools there were improvements in teacher and student attitudes. However, improvements in student academic performance were only noted at the school where TEAMS had been in place the longest or where the students had prior experience in a similar instructional approach in elementary school. There was also better achievement where the teachers most faithfully implemented the TEAMS essential components.

Forces beyond the control of the project staff such as staff and student turnover due to rezoning, lack of computers in some classrooms, and lack of access to appropriate student achievement data and discipline data hampered the ability to conduct a valid and reliable evaluation.

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