ABSTRACT.

This paper describes a summary of an experimental study that I have conducted at the University of Wisconsin-Whitewater in the Fall of 1994. I have taught three out of twenty-four Sections of Intermediate Algebra using Cooperative Learning approach together with Mentors. The goal was to investigate the impact of this approach on students’ performance by comparing the success rate of each Section (in the Pilot Group) against 21 Sections in Control Group. The study has shown that the students in two Pilot Sections made a significant improvement in their test scores.
Since 1987 I have been conducting experimental studies in teaching different undergraduate mathematics courses using Cooperative Learning approach. The results were positive and the teaching style, indeed, enhanced students’ learning and performance. In Fall 1994, with the strong support of campus administration I have decided to implement this approach together with mentors in teaching three out of twenty-four Sections of Intermediate Algebra. This project was funded by a grant from the University of Wisconsin-Whitewater. The fund has been used to hire four students (to serve as Mentors and grade weekly homework assignments), and also to pay a part-time academic staff to grade all exams for Pilot Group.

The main objective of this project was to analyze the impact of this Approach and Mentors on students’ achievements in Pilot Group by comparing the success rate of each Pilot Section against each of the Control Sections. The twenty-one Control Sections were taught by other colleagues using the traditional lecture method. Both Groups used the same textbook and took the same common exams; three interm exams (200 points each), and the final (300 points). Furthermore, up to 100 points was given to students by instructors for homeworks or quizzes. I used the 100 points for Group Homework assignments. Therefore students’ assessment was based on two factors which includes: Individual Evaluation (four common exams/900 points), and Group Evaluation (Group Weekly Homework assignments
(100 points) for a total of 1000 points. Students’ grades in Pilot and Control Groups were figured out based on the curves determined for each exam by a committee consisting of all faculty who were teaching this course.

On the first day of each class, students were divided into seven heterogeneous groups of five members each based on their past performance, sex, and race. Considering these factors one member in each study group was then selected as leader who guided the scheduling of regular weekly group meetings outside of class and taking attendance. All students were instructed that no one should dominate the discussion or rush on providing solution to a specific problem, so that all members get a fair chance to make contribution in solving a math problem.

Three to five groups have been assigned to each Mentor depending on his/her availability and Groups’ out-of-class meeting schedule. Mentors were responsible to monitor the outside classroom meetings of their groups, to provide assistant if needed, etc.

I initially held a separate meeting with the Group Leaders to discuss their responsibility to the performance of each group. The success of the group would depend upon the active involvement of each person, directly contributing to the final outcome.

I also had meeting with Mentors once a week to receive graded homework assignments, to discuss their groups’ math performance, to get feedback to help students better, so on and so forth.

In a reversal of the traditional role of a mathematics teacher, I have given a brief lecture (if needed), and then asked the groups to do reading and work on their assignments. A portion or sometimes an entire class period were used for group
inside-classroom activities. My task was to move among the 
groups to provide assistance. The three Pilot Sections met twice 
a week; two Sections on Tuesday and Thursday, and one on 
Monday and Wednesday for 75 minutes per session.

Each week, groups were assigned sections from the 
course textbook. It was the duty of each group member to study 
the material prior to the weekly meeting outside of class and to 
bring ideas and questions to the group problem-solving session. 
Through collaboration the five group members would exchange 
ideas and strategies to solve the assigned mathematical 
problems. The mentors were on the side observing their activities 
and providing assistance to get them going if needed. It should 
be noted that the mentors were not providing solution to any 
particular math problem, but giving some hints so that the group 
members can solve it by themselves. In other words, the Mentors 
were not acting as Math Problem-Solvers for them.

CONCLUSION

This structured pilot study has shown that using 
Mentors and Collaborative Learning in teaching Intermediate 
Algebra has resulted in improvements in students’ test scores. 
Comparing the success-rate of each of 24 sections in this course 
has shown that Tuesday-Thursday Pilot Sections ranked second 
and third with success rates of 89% and 86%. But Monday-
Wednesday Pilot Section ranked 18th with 63% success rate. 
This section in compare with the other two pilot sections missed 
two class sessions right at the start of the semester. Because fall 
semester began on Thursday before Labor Day weekend, 
therefore students in this section had their first session on 
Wednesday of second week of classes. Usually It takes three to 
four weeks for groups to get used to cooperative learning 
approach and function effectively, because this method is slow at 
the start by its nature. And students in this section was hit by the 
first common exam before they can catch up with other classes
and learn all the materials needed for the exam. Consequently, most students were unable to recover from low scores that they received on their first exam, although they worked hard to make it. I may add that I was concern about this section before the school begins and tried to switch it with another Tuesday-Thursday section, but it was not feasible to do so. Nevertheless, the Mentors and I found that:

- The Cooperative Learning Approach actively involves students in exchanging ideas and working out math problems.
- Presence of mentors during outside class meeting created a better supportive environment.
- Students increased their ability to communicate mathematics through writing, reading and oral discussion.
- Students learned to cooperate with others and found it easy to be involved with study groups where questions can be asked freely without having the fear of being wrong.
- Students learned and practiced group-decision making skills which are important in today’s marketplace.
- The teacher-student relationship is friendlier than in the lecture method.
- Group inside classroom activities provided me the opportunities to observe students’ reasoning and strategies on solving a particular problem.

Finally I intend to believe that cooperative learning in mathematics will become increasingly popular by the year 2000, for it can offer a new and dynamic way for students to learn mathematics.