

A ROAD TO REDESIGN WITH PEER TUTORING

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Abstract

As part of the plans to improve instruction in lower division courses, graduate and undergraduate assistants are used as peer tutors in the MILE (Mathematics Interactive Learning Environment) classroom. The purpose of this paper is to describe the positive impact of peer tutoring on student learning and retention.

Pedagogical Techniques: Improving Student Learning and Retention

Georgia State University is one of a growing number of universities using a new approach to teaching introductory college courses. The “Roadmap to Redesign”, R2R, approach replaces lectures with the use of a variety of learning resources. This is a move from “tell me” to “involve me”. Students spent 50 percent of their time in the classroom with the instructor acting as a facilitator for focus groups and 50 percent in the MILE classroom working actively on their assignments. The MILE, the Mathematics Interactive Learning Environment, is an 88-station computer classroom. A course coordinator and a MILE coordinator ensure a sound pedagogical practice in the retained classroom time and in the MILE classroom.

The Course Coordinator

The department provided a greater organization of the faculty teaching the courses by providing a course coordinator. The course coordinator supervises, coordinates all the classes, assists faculty in classroom facilitation practices, monitors the coverage of the courses, oversees the development of all material as well as to provide materials, handouts, etc to the faculty. All sections share common syllabi, outlines, schedules, assignments, assessment instruments, class activities and a course web site. The course coordinators and the common materials provide more uniform alignment of the individual sections with established content and assessment standards.

The MILE Coordinator

The MILE coordinator supervises and schedules all activities in the MILE classroom. Such activities include coordination of the MILE classes and materials, the MILE classroom format, and training of faculty to use the computer, *MyMathLab* software, and

to understand the implications for teaching the redesigned courses. A workshop for faculty each semester, monthly meetings as well as the coordination of the mandatory two hours of office hours each week in the MILE is the responsibility of the coordinator. Also, the coordinator will hire and train graduate research assistants (GRAs), graduate learning assistants (GLAs), graduate teaching assistants (GTAs), and graduate & undergraduate mathematics student assistants. Student assistants are trained on *MyMathLab* software as well as on their responsibilities in the MILE and on how to assist students who come into the MILE with questions.

The MILE - The Mathematics Interactive Learning Environment

The MILE classroom is to support the redesign of the delivery of College Algebra and Precalculus. It is a technology-driven facility consisting of 83 regular student stations, 1 ADA compliant station and 4 instructor stations. It provides students with an array of interactive materials and activities through *MyMathLab*. The MILE provides one-on-one assistance through faculty instructors as well as peer tutors.

Peer Tutors

The peer tutors consisted with GRAs, GLAs, GTAs, Graduate Mathematics & Statistics students' as well as Undergraduate Mathematics & Statistics students. Tutors for the MILE are hired based upon their qualification, their transcripts and an interview. After the tutors are hired, the MILE coordinator provides a training workshop in order for the tutors to be trained on the *MyMathLab* software, on the operations, procedures, and activities of the MILE as well as on how to work with the students that enter the MILE classroom for assistance. Tutor training is essential to the success of student learning and retention.

Qualifications, Transcripts, Interview

Every semester, peer tutors are selected for the MILE classroom. The GRAs, GLAs, GTAs application is provided by the Director of Graduate Studies in Mathematics as well as in Statistics. All other Graduate and Undergraduate Mathematics & Statistics students submit an application that was created by the redesign project team which has the qualification requirements needed to be a MILE peer tutor. Basically, the main requirements for the Undergraduate students will be to have a minimum of a B average in their Mathematics classes and the completion of the Calculus sequence. Graduate student requirements are mainly to have a B average in their Graduate mathematics courses.

The MILE coordinator evaluates the applications and the student transcripts in order to determine which students should have an interview with the hiring committee. The interview will determine if a student understands the mathematics that are being taught, their explanation of the mathematical concepts, as well as their people skills. One main aspect in the interview process is that all applicants are given the opportunity to demonstrate their tutoring skills to the committee by demonstrating how they would help (tutor) a student with a particular math problem. The hiring committee will then select 8

students from the list of GRAs, GLAs, and GTAs. These students will consist of 4 from Mathematics and 4 students from Statistics to work in the MILE. From the Graduate and Undergraduate Mathematics & Statistics students who have applied, 7 students will be selected. This will provide a total of 15 peer tutors in the MILE classroom for the semester that are available for one-on-one help to the College Algebra and Precalculus students that enter the MILE classroom for assistance. Furthermore, if a GTA has been working in the MILE for a semester and has demonstrated that they could teach and facilitate a course, then they will be selected to serve as an instructor for one of these lower level courses the following semester. Hence they will be serving the department that next semester as an instructor of either a College Algebra or a Precalculus course as well as continuing as a peer tutor in the MILE.

MyMathLab Training

One essential aspect for the success of improving instruction in lower level courses is in the training of the peer tutors on the mathematical software that will be used, *MyMathLab*. Tutor training on *MyMathLab* software will be provided by the MILE coordinator. This will include an overview of the software as well as its features. Tutors will also be given the *MyMathLab* software package and an access code for the College Algebra Class and the Precalculus class for that semester. This way the tutor can keep up with the daily lessons and activities for each class that comes into the MILE for their class session. Tutors are required to go through and work out the weekly lessons and complete all the homework and quizzes planned for the MILE students. The weekly homework and quizzes as well as the lessons are to be completed one prior to the actual MILE students' assignment time. The MILE coordinator proctors each tutors progress through the *MyMathLab* software package in order to make sure that the tutors are doing the work, keeping up with the current class assignments and that they get a 100% on all the weeks work. This way if a tutor finds that they have missed any aspects or do not understand the material then the tutors can ask the coordinator questions. This way, tutors will be prepared to assist students on the lessons for the week now that they have gone through the lessons themselves and practiced to understand fully the concepts being presented.

MILE Operations

The MILE coordinator provides each tutor with a list of rules and regulations for working in the MILE facility. These rules are strictly enforced. The coordinator is in the MILE daily to oversee the tutors doing their job. Weekly meetings of the peer tutors are conducted by the MILE coordinator. Each week the rules and regulations are repeated to make sure the tutor does not forget them. The rules include but not limited to: how students enter and exit the facility, reminding tutors to walk around the room to help when a hand is raised, checking student's identification, proctoring tests, doing the *MyMathLab* homework and quizzes, as well as not playing on the computer and not doing personal homework. The weekly meetings provide the tutors with an opportunity to ask questions about mathematical topics and concepts that will be coming up the

following week for students. It gives them the opportunity to ask the coordinator about the best way to assist students with certain mathematical concepts. It gives the MILE coordinator the opportunity to remind peer tutors on how to assist students on a one-on-one basis. It is very important for the tutors to take their responsibility of working in the MILE very serious. They are hired to represent the department and assist students in any way they can.

One-on-One assistance

Tutors are advised to be caring and attentive but not overbearing to the students who seek help in the MILE. Just because a person knows the subject matter does not mean that they know how to be a good tutor. Therefore, this is why tutors need to be carefully selected and trained to have the proper skills and attitude to give one-on-one assistance in the MILE. The object is to be friendly, helpful and knowledgeable about the mathematics and the *MyMathLab* software. Tutors should be available to assist and guide a student through a problem, not just give them the answer. They should encourage students to try their work and ask prompting questions to guide the student through their problem solving process. Being a personal coach to a student and facilitating them in their problem solving task is more beneficial in the long run to a students' success in the class. Providing students with immediate feedback on an individual basis to a student needing assistance is very positive and rewarding to that students' progress in the course.

Results

The MILE provides trained assistance to support the learning activities of students as well as to support students' varying levels of preparation and different learning styles. The MILE provides cooperative learning or one-on-one peer tutoring, that is students could request certain tutors to assist them as well as assist each other. Students seem to be comfortable in this type of learning environment.

Tutors work during the MILE classroom time as well as other times when no class are scheduled. Students come into the MILE to attend class or at other times just to do their mathematics lessons, homework or to study. As soon as they have a question or needed assistance, their hand would go up and immediately a tutor would be at their side to provide one-on-one assistance. It was noticeable that some students even had a favorite tutor. Students would be in the MILE during the times of the day when their favorite tutor was working. The MILE provides this positive academic gain for students.

The MILE is truly a peer resource facility when cooperative learning groups are formed and each person involved experiences a role of both the 'helper' and the 'needs help' role. Students created their own study groups in the MILE with their fellow class mates. Peer collaboration creates a surrounding of social activities that supports and provides a diverse way to accommodate student learning and build confidence in their ability to

succeed in mathematics. This learning environment design is student-centered in order to engage the student in their own learning process.

Conclusion

The primary academic goal of the redesign is to provide a successful environment for learning mathematics. In our case here, successful results are in mastery of the mathematical concepts of the courses being taught, College Algebra or Precalculus. The MILE provides a peer resource facility and has been shown to be a positive academic gain for students. Students are willing to come to their mathematics class and not feel frustrated when they do not understand a concept. They know that they can go to the MILE classroom and get one-on-one assistance right away. They know that assistance is at their fingertips, “just in time” assistance. By knowing that they can get help exactly at the time they need the help, students are more confident in doing their mathematics. Peer interaction can have a powerful influence on academic motivation and achievement (Wentzel, 1999). At GSU, students’ grades have improved in the College Algebra and Precalculus courses. The pass rate (A, B and C grade) are up and the DWF rate for these lower level classes has dropped substantially over the last year. Having the 15 peer tutors each semester in the MILE to assist students in the College Algebra and in the Precalculus courses not only provides students with an atmosphere of support to build their confidence in their ability to succeed in their mathematics classes but it also has been found that peer tutoring is consistently more cost-effective.

References

Wentzel, K.R. (1999). Social-motivational processes and interpersonal relationships: Implications for understanding motivation at school. *Journal of Educational Psychology*, 91, 76-97.