Use in the Math Classroom

Math classroom time directly influences how students shape their studying time outside of class. Most of the time, instructors are the most influential educators in the students' lives. Thus, integrating experiences during classroom time that focus on how to learn math helps to demonstrate the importance of developing productive study habits and attitudes.

Before providing some specific examples, it is important to think about the following principles that are based on our and other instructors’ experiences using this workbook.

1. Complete the study skills chapters during the first seven weeks. This allows enough time during the rest of the semester for students to practice the study skills and reap immediate benefits.

2. Since an instructor’s time is limited, collaborate with the math lab or learning assistance center staff in designing activities for the students. For instance, require students either individually or in small groups to go to the lab or learning center and work on organizing a week’s worth of notes in a way that they can be used as review tools. They can practice the three-column note-taking method in chapter four.

3. Schedule chapter reading and questions to be due during the first of each week or math unit/section. Do not allow students to turn them in on test day. They may wait until the night before the test and do the questions when they should be reviewing test material.

4. Require more use of some of the specific study skills than just answering the questions at the end of each chapter. Some examples include note-taking, test-prep strategies, and test-taking strategies.

5. Place some study skills questions on each math test and/or quiz. This will force the students to review.

6. Some students may need referral to the counseling or learning assistance labs for more intensive assistance, particularly with test and math anxiety, as well as with other negative attitudes and behaviors that keep students from learning math.
Examples of Transforming MSSW Learning Strategies into Teaching Strategies for the Classroom

Modeling study skills in a math class does not mean the instructor has to stop talking about math content. Instructors can find ways to use the study skills as learning activities in class that help the students practice math and study skills simultaneously. Students will appreciate this because they don’t want too much time taken up with study skills either.

Chapter 1: What You Need to Know to Study Math

Ask student groups to complete the following:

“Learning math is like . . .”

They can create their own analogies and then share them with the class. This is an activity that will foster a more relaxed environment. They can laugh a little while learning!

Use the four steps to learning math (understand, process, apply and remember) directly in your presentations. Discuss how the activities you have planned first are to help them understand and process the concepts. Then design some activities that focus on helping them apply the concepts. Finally, provide regular review times to help them remember as they progress through to the test. It is important to make clear the purpose of each of these activities so students can see the four steps in action.

Chapter 2: How to Discover Your Math-Learning Strengths and Challenges

Ask student groups to review the inventory questions and turn as many of them as possible into study strategies. Help them decide whether the strategy is visual, auditory, kinesthetic, or a combination. Encourage each student to choose one of them to try during the week. Design some type of follow-up to make sure that they do it.

Break students into study groups based on their cognitive styles for one study activity. (The distribution has to be suited for this activity.) Ask students how it went. For the next activity, divide students into study groups and place different cognitive types into each group. Ask students how it went. This activity can raise their consciousness level about different ways students learn, think and work.

Chapter 3: How to Reduce Math Test Anxiety

This is one chapter that requires devoted time to discussing each concept carefully. If you do not feel qualified, give the chapter to a counselor and he/she
can come in to discuss it. *Make sure they are on board with this chapter and stick to these strategies.* Some of your students may have serious problems with anxiety and discussing it will upset them. Make sure you offer follow-up support for them, such as in the counseling department. At one of my institutions, one of our counselors specialized in helping students with anxiety.

**Chapter 4: How to Improve your Listening and Note-Taking Skills**

Use the different suggestions for warming up for math class as introductions during the first few minutes of class:

1. Allow the students to review their notes for five minutes.
2. Ask students to compare certain homework problems.
3. Ask students to review their notes and prepare a couple of questions to ask.
4. Ask students to preview the learning objectives in their textbooks that they will be covering in the class that day.

As a class, come up with some abbreviations that everyone can use.

Model the three-column note-taking method by organizing your board work in three columns.

**Chapter 5: How to Improve Your Reading, Homework, and Study Techniques**

Early in the semester, model how students should read their textbook in class. Take the “Ten Steps in Understanding Reading Materials” in chapter five and modify them to work for their specific textbook.

Allow some time for students to work on a couple of homework problems together so they can see whether they benefit from working with study buddies.

**Chapter 6: How to Remember What You Have Learned**

Select at least one strategy for each type of learning style and use it as a learning strategy in class. Bring a videocassette or DVD to class and show a portion of it that applies to what they are currently learning. Find a kinesthetic way to figure out a problem and use it in class.

As a class, come up with some mnemonic devices students can use for particularly difficult to remember math concepts.

End classes with time for students to come up with representative test questions that you can turn into a practice test.
Chapter 7: How to Improve Your Math Test-Taking Skills

Provide time in class for students to practice using the Ten Steps to Test-Taking on a shorter practice test.

Spend time in class on analyzing their tests to figure out what kind of test errors they made.

When using the Math Study Skills Workbook for the first time, do not overwhelm yourself with trying to change all of the study skills into learning strategies. Select the ones that you and the students regard as most important and start with those. With each new semester, you will be able to integrate more and more study skills into classroom learning.

Assessment

Students must receive grades for their study skills work whether the work is minimal or intensive. We suggest making a grade rubric for these activities and include it in the syllabus. This is a visual strategy to say, “This portion of the course is important.”

Minimal assessment and participation:

Chapter quiz grades; chapter questions; study skills questions on major math tests; learning modality inventory; math autobiography

Intensive assessment and participation:

1. The above
2. Portfolio of some of all of the following:

   notes (original and reworked)
est test questions for practice,
vocabulary list
homework
tests with analyses

Some instructors avoid this type of assessment because of the grading time it adds to their out of class hours. Solutions? If the instructor has a detailed rubric which involves checking off and adding up points, he/she can grade portfolios during test times. Some math departments have skilled professional tutors who can grade during the down times.
Use in a Math Lab or Learning Center

An excellent strategy to provide a supportive and unified learning experience for math students is to make sure that math labs and other math learning centers are closely connected to what takes place in the classroom—in content, learning strategies, and philosophy of helping math students. No matter what extent the labs and centers are connected with the classrooms, math instructors who use the *Math Study Skills Workbook* can extend the support by helping their students learn how to collaborate their own efforts with the labs and centers. Students need to hear the same messages about learning how to learn math.

For instance, the labs and centers can support the instructor’s effort to help students improve note-taking. The instructor can share the basic style of note-taking steps he/she would like students to learn and the labs/centers can help students practice and/or adapt the steps to work best for their unique learning styles. Students hear the same message: “Note-taking is important in learning math.”

This collaboration can be as formal or informal as fits within the campus culture, academic support structuring, and staffing. The following are examples of different collaborative initiatives:

1. **Structured:** Lab or learning center staff members are trained to use the workbook during mandated student lab hours. Scheduled group lab class hours focus on study skills primarily during the first seven weeks of the semester. Students are assigned specific lab times.

2. **Less Structured:** Instructors require students to work in a lab or learning center on their own time, completing assignments and practicing workbook concepts and study skills. Lab center staff members are still trained to assist in this process.

3. **As needed basis:** Students who are identified as at risk at the beginning of the semester are required to use the workbook in the lab or learning centers during the first seven weeks. This is excellent for any student who is repeating a course, or is entering the course with a weak math and study skills background. Counselors may work with individual instructors to set this up. This usually requires some type of institutional policy.

4. **As needed basis:** A student who earns a C or lower on the first test must attend tutoring that also includes using the workbook as a basis for improving studying. *This is in addition to the use of the workbook in the*
classroom. If the student makes a B or above on the next test, the tutoring is not mandated. If the student makes a C or lower on the next test, he/she must resume tutoring with study skills included.

The math labs and learning centers can use the workbook even if the instructors do not use it. They can keep a supply in the bookstore and refer students who are using the learning assistance services on a regular basis for help in learning math. The tutors can work with the students using the workbook as part of the learning assistance. This is excellent for the students repeating math courses or who are extremely anxious about their math courses.

For other initiatives contact Paul and Kim Nolting at www.academicsuccess.com.

Use with an Instructor/Counselor

Math is a common hurdle for students to clear. Many students end up in a counselor’s office. We suggest that math faculty and counselors work together in the following ways:

1. Set up a referral system that identifies students who are struggling within the first two weeks of a semester. Do not wait until the first test. Refer students in time for them to get help preparing for their first test.
2. Keep a supply of the MSSW in the bookstore. Highly suggest and pressure the student to purchase it. (The MSSW can be placed on the syllabus so that they can use student grant funds to purchase.) Remind them that it costs the same as two medium pizzas.
3. A counselor can work with the student to decide the key issues that need to be addressed and assign those chapters or sections first. They also can set up a study schedule and a follow-up counseling session.
4. After the first test, a counselor can meet with the students to see what needs to be adjusted in their studying to improve on their second test, even if they passed the first one.

Even though it is best to help students before they are in trouble, this is an excellent intervention as a follow-up to the popular academic alert programs at many colleges. It is also excellent as a mandatory activity for students repeating a math course.
Study skills workshops are excellent opportunities for students because they do not have to sign up for an entire course, and they are usually free. On the other hand, workshops are usually *jammed* full of excellent information. Subsequently, students are overwhelmed when they get home, and find it difficult to figure out which strategies they should try first.

The *MSSW* can be used to supplement a math test anxiety/study skills workshop, providing follow-up guidance for the students in practicing and acquiring more productive study behaviors and attitudes. Often, students leave workshops hoping that the workshop itself is going to help reduce their test anxiety. They do not realize that they must *practice* new study skills and behaviors. Attaching the *MSSW* as a supplement will let the students know that changing behaviors requires practice and more practice.

There are numerous ways to set up math study skills and test anxiety workshops that provide continual support. Here are a few suggestions:

1. Instead of just one workshop on math, conduct several, each one covering one of the following subjects:
   a. Improving note-taking and homework
   b. Reading a math textbook
   c. Preparing for and taking tests
   d. Managing math and test anxiety

   Require students to purchase the *MSSW* for the above workshops.

   Students may need an incentive to attend. Instructors can offer points to students who complete the series of workshops and the follow-up work using the workbook. Or, some institutions set up a one course credit for completing a series of workshops and follow-up work. The lead instructor or counselor of the workshops is responsible for seeing that students attend the workshops and complete the workbook. The lead instructor or counselor also turns in the grades.

2. Student governments are always looking for projects that benefit their peers. They can sponsor the workshops and the students attending them. They take on the responsibility for advertisement and provide the workbooks for the students. Instructors, learning specialists, or counselors still conduct the workshops.

3. Learning centers and labs may also offer workshops using the independent work method. Students sign up for a one-credit course housed by the learning center. It is best if the students are also enrolled in a math course.
Students are required to complete each chapter and demonstrate the math study skills using their actual math assignments. If the students are not in a math class, instructors can work with the learning center staff to develop some review materials that the students may use to practice their study skills. This is an excellent requirement for students repeating a math course.

Dan’s Takes

The addition of “Dan’s Takes” to each chapter adds a student voice to the workbook. Dan’s authentic college experiences and the lessons he learned from them support key concepts in each chapter. “Dan’s Takes” add color to a very practical workbook. Students end each chapter by reading a positive story about a student’s real experiences and the lessons he learned from them.

Using “Dan’s Takes” as a basis for discussion can help instructors to connect with their students.

1. Ask students to share similar experiences in small groups.
2. Ask students to write a short response to the “Dan’s Takes.” They can write about similar experiences.
3. Ask students to “give advice” to prevent Dan’s negative situations from happening again, using the tools they have gained from the chapter.
Getting the Most Out of Group Learning

Group learning has infiltrated every level and discipline in education. In my work as a consultant, however, I have observed productive and counter-productive group learning. The following advice is based on my own experiences, observations of other’s experiences, and what research says about active learning.

Words of Advice

1. Assume that students do not know how to work in groups.
2. Do not use your time to grade papers while students work in groups.
3. Always know why you choose to use group learning instead of other approaches. Ask, “Why is group learning advantageous for the learning outcome?”
4. Never make large groups for classroom learning or out of class projects. For classroom learning, I suggest 3-4 students per group. This decreases the probability for some students to do what social-psychologists call social loafing – putting less energy/effort into the task than they would if working alone.
5. Provide written instructions for each group learning activity. Make sure they are detailed. Many times, after providing written instructions several times, students learn the routine. If the next group learning activity follows the same process, you do not have to continue providing the written instructions. If any group learning activity is different from previous ones, provide written instructions once again.

Selecting Appropriate Times in the Learning Process to Use Groups

When faculty members participate in professional development that focuses on group or active learning, they should be careful. What works in other academic disciplines may not work in mathematics. For instance, the purpose of some group learning is for students to create their own comprehension and meaning. Obviously, with some exceptions, math is limited in interpretation! Use the following questions to guide your decisions in selecting group learning.

1. Do the majority of students in each group understand the math concepts on which the activity is based?
2. Are the students in the application or review stage of the learning process regarding the concepts on which the activities are based? If so, group learning is a productive tool.
3. Do the majority of students in the class learn well in groups? Not all students learn well in groups.
4. Is there enough time to allow students to work on the task? Not enough time produces frustration while too much time can often decrease productivity. After you facilitate a group learning experience for the first time, make notes about whether you need to adjust students’ work time in the future.
5. How are you going to assess the students’ participation? Students need to know up front. At first, I suggest to assign points. One way is to save the group learning for the end of class, allowing enough time for completion. If groups get the task completed correctly, they receive “bonus” points.

**Instructor Role in Group Learning**

When I was an administrator, naturally I peeked into classrooms as I walked down the hallways. I witnessed instructors grading papers and reading books while their students worked in small groups. Meanwhile, the students were not actively involved in their work either!

Small group work is an excellent time for instructors to informally assess whether the students really know what they are doing. Walk around the room.

1. Listen to what they are saying while working on the learning tasks.
2. Listen to whether they are using math vocabulary.
3. Provide corrective guidance at the appropriate times.
4. If several of the groups are making the same mistakes, stop the small groups and get the whole class back on track. Make sure you do this quickly so the groups have time to move forward. If the class is really off course, suspend the small group work for another day and re-teach the information.

**Group Learning Structures**

1. *Think/Share/Pair:* During your presentation, ask students to pair up with someone next to them. Provide a short application problem. Each pair works on it. Then ask for one pair to share with the whole class while others respond or ask questions. This is a quick activity that gives students a mental break from note-taking and the opportunity to apply a few concepts immediately.
2. *Small group peer teaching:* Assign each group a different problem to complete. After completing the problem, the group teaches it to the rest of the class. This may take place in the same class period or in the next class. This technique is excellent for review and test preparation.
3. **Small group application:** Each group works on the same set of problems. The groups do not report back to the whole class.

Small group learning can be a powerful tool. It creates an opportunity for immediate application, active learning, development of collegial friends, and informal assessment.

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**Learning Inventories**

*The Learning Modality Inventory for Math Students (LMIMS)* assesses a student’s preference for taking in and registering information as well as retrieving information to complete a math problem, to study, and to learn. The inventory identifies strengths in visual, auditory and kinesthetic modalities. The questions are designed to reflect learning in the classroom and other learning environments outside of the classroom.

**Strategies for Using the LMIMS as a Teaching and Learning Tool**

1. The first way to use the inventory is to look at the total final scores. Students can receive strong scores in more than one modality. It is quite possible that they use two or more modalities when learning math. Students should look at the list of study strategies in chapter six for each of their strong preference modalities and compare the list to how they currently study. If they match, students can continue working on using them more effectively. If there is no match among their preferred modality lists of learning strategies and their current study strategies, students can experiment with new methods.

2. It is possible that some students may not score strongly in any of the modalities. When this happens, ask the student to use their strongest preference. Some students may be so inexperienced that they cannot take the inventory with reliable self-assessment. In this case, they may benefit from “watching themselves study” for a while. They may discover that they do not have any type of system for learning math. Guide them in trying learning strategies for kinesthetic, visual and auditory learning modalities. They may identify their preferences for learning math through experimenting with different techniques.

3. Most of the questions can be turned into learning strategy suggestions. After taking the assessment, ask the students to reread the inventory and list suggestions that are imbedded in the inventory questions.
4. With the *LMIMS* results in hand, each student can create a learning system, using the learning strategies suggested in the workbook for the different modalities. They can write their own “Individualized Educational Plan” for their math classes. To motivate them to carry through with their plan, offer points as a reward to students who can show evidence that they have tried their strategies.

The *LMIMS* is a tool that instructors can use to help their students become self-regulated learners – students who try study strategies, assess their effectiveness, and if necessary revise their approach.

**Administration of the LMIMS**

When introducing the *LMIMS* to the students, make sure that they understand there are no wrong answers. These questions only help students to identify their preferences for learning math. There are many ways to learn math.

If students say they don’t know how to answer a question, encourage them to answer based on their “gut” reactions as to what they really do in the given situation, not on what others believe they should do.

Read and demonstrate how to take the *LMIMS* by answering a few questions as a student might answer them. Reiterate that they need to answer questions based on how they actually are learning and studying, not what they have been told they should do. They need to answer the questions without thinking too hard.

When students score their answers, monitor carefully for accuracy.

It is wise to administer the inventory during class time because if the inventory is made an out of class assignment, some students may come in without the completed inventory, while others may do it quickly outside in the hallway right before class!