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Introducing Undergraduates to Mathematics Information Resources

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Undergraduate students of mathematics are traditionally not heavy users of library materials for their coursework in mathematics. Likewise, many instructors of mathematics are inclined to limit the scope of their undergraduate students' work to "straight" mathematics—working problems and doing homework assignments. Why should students be introduced to the information resources in their field? First of all, those students who plan to go to graduate school will need to know how to get information on basic research in mathematics. Likewise, those students who are planning a career in mathematics in an industrial or applied situation need to know how to gain rapid, timely access to mathematics information. These are the most obvious and practical benefits; however, by using mathematics resources, students will both develop a sense of the richness and variety of mathematical research, and understand the processes and development of the discipline. This can be true for both math majors and non-majors. By taking mathematics out of the textbook so to speak, and into a larger scheme of things, this can become part of a student's complete educational experience in mathematics.

Probably the best way to introduce students to mathematics information sources, and achieve the aims stated above, is through library-based assignments. Following are three suggestions for assignments that could help students achieve these ends. These assignments have been developed as alternatives to actually writing papers. It has been my experience that unless such an assignment is approached very carefully, having students write a term paper is not the most effective way for students to become acquainted with resources in a particular area, and a more directed assignment, like these, is much more successful.

The first of these assignments is designed to allow students to gain facility in using mathematics information resources, before going on to work on a project or assignment in which they will have to use these resources. Students have an introduction to their library and its materials in mathematics, and are given a handout describing these. Then they must complete a worksheet to demonstrate their facility with these materials. The worksheet consists from eight to fifteen questions that must

be answered by using library resources. This assignment is particularly useful for students because it not only gives them a thorough preparation for their course assignment, but gives them a general introduction to mathematics resources that they will find essential in either graduate school or in the working world. I have used it the past two years in a course in Mathematical Modelling, where the students are required to develop an actual model of a real world situation. They are expected to do a literature search as part of their project. The response from the students has been very encouraging. In spite of the course instructor's and my own worries that the students might find this too much busy work, they have considered the experience very useful for both this course and others.

The second assignment addresses the third and fourth reasons that I gave for introducing students to mathematics information resources, namely that such assignments allow students to gain appreciation of the richness and variety of mathematics, and a better understanding of the processes and development of the discipline. In this assignment, students would develop an annotated bibliography on a topic currently being investigated by mathematicians. They would find between ten and fifteen articles written about this topic over the last ten years, and write short descriptions of the articles and why they are important. They would also write a one page description of their search process. The assignment would culminate with a five to seven minute oral report by the student in which he or she would summarize the current state of research on the chosen topic. This is a particularly useful assignment because of its flexibility. The number of articles to be found can be increased or decreased, or the pitch of the articles can be changed, from fairly simple, straight-forward descriptive works for an introductory class, to more advanced, scholarly works for an upper-level class. The aim of the assignment is for students to begin to find out about some of the areas of modern mathematical research, and tell how they found out about it, i.e. through systematically using and evaluating library resources. I have not used this assignment in a mathematics class, yet. However, it has been used successfully in a class in microanatomy for several years.

The third assignment is designed to help promote students' understanding of the development of the discipline of mathematics. In contrast to the second assignment, which emphasized students' exploration of areas of current research in math, this assignment takes a more historical approach. Students assess the scholarly contributions of a single mathematician, based on his or her published research and its evaluation by their peers. They would read about their subject, and either read or read about their publications, depending on the level of the class, and the particular area of mathematics in which their subject worked. They would evaluate these publications, using citation analysis, secondary materials, and other sources, to determine the impact this particular mathematician had on their area of research and on the development of the field as a whole. The students would then write a short report (1-2 pages) describing their findings and research process. This assignment was recently used for the first time in a class in genetics at Trinity. The instructor and I developed a list of geneticists who had made fairly important contributions to the field, and let the students each pick a different name on the list on which to do their report. The students were particularly encouraged to relate the work of their subject to what they had discussed in class.

These three assignments can be used in a variety of mathematics courses, and with students with a variety of levels of expertise. The assignments themselves can be easily modified to suit the particular needs of different groups of students or different institutions. Ideally, the three assignments would be part of a continuum, beginning with the use of the first assignment in an intermediate math majors course, then using the second and third assignments in upper level courses. The aim would be to have all mathematics majors do all three kinds of assignments before they complete their program. However, the assignments are equally changeable to be used in lower-level, non-majors courses. Whatever the class, though, students' use of information resources in mathematics can give them a better sense of perspective on the entire field of mathematics, and increase their appreciation of its richness and diversity.

Note: Examples illustrating the three assignments discussed here are available from the author. Please send requests to: Sallie H. Barringer, Maddux Library, Trinity University, 715 Stadium Drive, San Antonio, TX 78284, (512) 736-7343.