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As a component of a liberal arts education, Mathematics should provide "Equal opportunity for all" students, regardless of major, to develop skill in mathematical thinking. But most mathematics students (or non-students as the case may be) do not enjoy merely rehashing their prior mathematical coursework: if they did well with the material previously, they will be bored because they know it already and can anticipate what is to come; if they did poorly with the material previously, they may well be fearful that here they are facing one more failure in the pursuit of their mathematical fortunes. I believe that one successful strategy for enlivening liberal arts mathematics courses is to incorporate into them material that is totally new to at least ninety per cent of the students enrolled in the course.

An effective and accessible tool for achieving this goal is graph theory, which has the potential for linking mathematical modeling with the everyday experiences of all students, even those who may not yet recognize the usefulness of mathematical thinking in everyday life.

Although the term has come into vogue only in recent decades, the concept of mathematical modeling has been used for centuries in the so-called "hard sciences" for the solution of myriad problems, the majority of which involve functions and/or equations, because the nature of the variables involved was continuous. Within the past half-century or so, however, the management sciences, the social sciences, and even the humanities have become aware of the applicability of discrete mathematical models to a broad spectrum of problems in their fields.

Mathematical modeling, particularly using graphs and directed graphs as models, is a very appropriate vehicle for developing skill at thinking mathematically in non-mathematical settings. A course using graph theory can provide liberal arts and other non-science majors with terms, tools and techniques for learning to apply mathematical thinking in situations with which they never dreamed mathematics could be associated.

All students may expect to encounter in their daily personal and/or professional experience, for example, a variety of situations that could require such skills as: 1) scheduling activities without time conflicts; 2) arranging several people or objects that have compatibility restrictions; 3) matching qualified people with available positions; 4) determining the minimal cost required for a project that has multiple option packages available; 5) computing the minimal time required to complete a project composed of several activities, some of which may be accomplished simultaneously and some of which must precede others immediately or intermediately; 6) ranking a variety of choices expressed by several people to determine a valid composite order of preference; or 7) ascertaining the maximal amount of resources that can be transported along existing channels, where portions of those channels may have different capacities.

Resolution of situations such as the aforementioned can be accomplished very directly using applicable graph and directed graph theory techniques: map-coloring, matching theory, minimal spanning tree algorithms, activity analysis digraph methods, tournament theory, flow in network procedures. If this theory and these techniques are presented geometrically, with an emphasis on diagrams rather than on set theoretic notation, liberal arts majors, social science majors and management science majors are soon able to use graphs and directed graphs to model situations from their own fields of study as well as from their living experiences.

In developing such an elementary course in math modeling over the past ten years, as an option for our humanities majors who need a non-specified mathematics core requirement, I have incorporated an extremely successful pedagogical device for enabling students to recognize the relevance of graph, theoretic techniques in their future experiences beyond the mathematics classroom: an independent project in which each student composes then solves a variety of original problems based on the student's major and/or personal experience, actual or potential, with each problem lending itself to solution using a different graph or digraph theoretic technique.

It is in the execution of the individual projects that the ingenuity and creativity of the different members of the

class are evidenced. One project requirement is that each of the various original problems must lend itself to different solution technique with some problems needing graph theory and others, directed graph theory. Some students conjure up problems that have no relationship to each other. However, a trend that began to develop about the third or fourth semester that I included the project in the course was that of having a theme to unify the various problems which they composed for their projects: one used work situations in his father's business; a second used her experiences during an internship at a local television station; another fantasized about how graph theory and digraph theory could have alleviated some of the problems encountered in certain Mother Goose Rhymes; and still another became Diane Graph, authoress of a "Dear Di" advice column in the MATRIX, the school newspaper of Modern Math University. English majors in particular have had a field day with creativity in their projects!

Reactions from students over the years have been generally quite positive, in part because many of the students have performed considerably better than was usual in their previous math courses. A significant number of these students have indicated to me verbally and/or in written evaluations, "This is the first mathematics course I have ever really enjoyed." Included among my most enthusiastic students have been several married women who have returned to college after a time lapse and who have found the course interesting and non-intimidating.

My original purpose for the project was to increase my supply of applications in the cross-section of majors generally represented in a class section. My discovery of its pedagogical value was accidental: student's performance on word problem sections of examinations improved significantly after their completion of the projects. Moreover, many students have returned after taking the course (often after graduation) to relate further applications the have been able to make in their jobs or living experiences. To me this says that they have learned to apply mathematical modeling to their life experiences, that they have developed their ability to think mathematically in a non-mathematical setting. To derive such results is for me a crowning achievement for the course!