Learning Objectives for the New Community College Mathematics Program

prepared by:

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I view the higher educational experience in mathematics in terms of "value added." Students enter college with certain mathematical skills and abilities (tempered by the fact that many technical mathematics skills, like language skills, are lost if not used) and certain goals. Thus, my view is that there is no specific set of skills that I feel should be "displayed" in order to graduate.

My concern is that so many students, all too often because of the narrowness of the curriculum for K-12, have little idea what mathematics is about and how it might relate to their personal life goals. Similarly, curriculum also very often has no relation to society's interests in having mathematics studied in college.

For example, many students want to major in business. The single most important tool mathematics has provided for "business" is mathematical programming (integer and linear programming) yet, a typical high school graduate has no idea that linear programming exists, despite many having been drilled about solving systems of linear equations in two or three unknowns. So here is a mathematical technique to help business students, but students who plan to pursue "business careers" typically graduate from college without learning about this powerful tool. Another kind of problem mathematics can give dramatic insight into is scheduling situations (planes, subways, hospital OR, police cars, school examinations and committees, and sports teams), yet few business (health sciences) graduates of college realize this.

Similarly, few students are aware mathematicians are interested in fairness problems. For example, if there are claimants with validated claims of $150, $225, and $375 (in hundreds of thousands) as a result of a bankruptcy situation and there are $600,000 to settle the claims, is it possible to give each claimant an amount which equalizes his/her losses? Working on fairness problems can not only develop thinking and modeling skills (and technique) for business students (and many other majors, including students

majoring in the health sciences) but also make them aware that mathematics has tools to resolve fairness problems.

In light of this I strongly feel that NCC's (New Community College) mathematics offering serve the needs of students by:

a. developing problem solving skills
b. developing modeling skills
c. developing technical skills that are suited to the needs of the students depending on their career choice path.

Some of these offerings will be in the form of "general education" courses that prepare students who chose to do so with being able to transfer to a 4-year college. Other offerings will support associate degree majors as well as the needs for students transferring to 4-year schools. A very brief look at how to conceptualize these mathematical goals is given below:

Understanding the role of mathematics and mathematicians in society

Students will learn about the nature of mathematics and its applications and the role mathematicians play in developing mathematics and using it to solve applied problems. These problems come up not only in career positions but in daily life situations.

Problem solving

Students will have the opportunity to use various mathematical tools: algebra (equation solving and the use of functions; matrices, etc.), geometry (graphs of functions and equations; graph theory, etc.), numbers, information and measurement (combinatorics, number systems, codes (for compression and error correction), estimation, measurements and measurement scales, etc.), probability theory and statistical methods (measures of central tendency and variance, conditional probability, measurement of risk, interpretation of probabilities), All this material would be developed using calculators and software when appropriate.

Mathematical modeling

Students will be exposed to new situations and learn to construct models for these situations using the problem solving mathematical tools they have learned. Students will learn how to use mathematical tools to investigate the models they have constructed and to evaluate the value of the solutions they find for modeling back in the original contexts from which they were drawn.

In a general way I urge that delivery of the mathematics be organized not via technique (solving linear equations, solving quadratic equations, etc.) but in terms of content themes such as:

growth and change
fairness
information
shape and space
unintuitive behavior.