Mathematical Articulation in New York State: Smoothing the Mathematical Transitions of Students

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A little more than a year ago, Richard Riley, the Secretary of Education in the Clinton Administration, challenged the mathematics community to address the problems of articulation in mathematics education between high schools and two and four year colleges. Secretary Riley created this national initiative through the National Research Council because of the growing breakdown of a smooth transition between high school and college mathematics, as well as the differences between mathematical experiences in different colleges when students transfer from one institution to another.

In large measure, this problem with mathematical transitions is due to rapidly growing national reform movements in mathematics education, both at the secondary level and at the college level. Instead of a relatively uniform secondary curriculum, many schools across the country have implemented a variety of reform curricula that provide students with different content and very different teaching and learning environments. If anything, these changes in the high schools are more extensive than what has been happening in the colleges for the last decade.

In response to Secretary Riley's initiative, the MAA appointed a special task force to address the issue and devise a national action plan for the MAA. As a member of this task force, I see some clear connections and significant implications for mathematics education in New York State that create a compelling need to create a comparable initiative here.

Some 20 years ago, the New York State Education Department implemented the Sequential Math curriculum, which is much in the spirit of the national mathematics reform movement in secondary schools. Effective this year, the state has begun to implement a new version of this program, a pair of courses called Course A and Course B. However, I am not aware of any colleges in the state that changed their mathematics offerings to reflect the Sequential Math curriculum in the New York high schools, what students are actually being taught, and the nature of the mathematical experiences that the students have come through. Moreover, most of the colleges in the state use standardized, national placement tests that are based on the old syllabus. (CUNY has apparently just developed and introduced a new placement test that reflects the Sequential Math curriculum.) Others use home-grown tests that are just as focused on the traditional high school curriculum.

For instance, Suffolk Community College, Nassau Community College, and SUNY Farmingdale all use the Accuplacer test, developed years ago by the Educational Testing Service. This test, like all the national placement tests, is designed to assess what students have learned from a traditional curriculum that has not been offered in the state for over 15 years. So countless students are being declared "remedial-level" and being penalized for not knowing things they were never taught. Moreover, the mathematics curriculum at these three neighboring institutions differs markedly. The curriculum at Suffolk is totally traditional, mirroring the old New York State curriculum. At Nassau, the curriculum is reform from precalculus up, while at SUNY Farmingdale, the curriculum is totally reform starting at the development math level; so, at these two schools, the students are being squeezed through a filter that has little validity for either their backgrounds or the mathematics courses most are about to take. At SUNY Farmingdale, we have begun to address the placement issue, but the mathematics department is encountering resistance from the placement office that does not want to change to a new test.

Each campus in the SUNY system is in the process of developing a rising junior exam in mathematics that will be given to all students moving on to the upper division. It would not be surprising if most of the resulting tests will similarly be based on a high school syllabus that has not been used in New York for decades. So, those students who took three or more years of high school math and have not had any remedial math experiences at college will be facing an exam that does not at all match their mathematical backgrounds. Many of them will likely be held back through no fault of their own. Similarly, students coming to SUNY from outside New York who have been through math programs based on the NCTM Standards may likewise be at a significant disadvantage.

This national initiative provides the opportunity to create a comparable statewide initiative that, I believe, should come jointly out of the State Education Department and the SUNY Provost's office. I suggest that it be a collaborative effort among the major professional organizations in the state. To that end, the Boards of Governors of both regional MAA sections (Metropolitan and Seaway) and of NYSMATYC have already discussed the issue and have agreed that such an initiative is essential and that they would want to be part of the resulting efforts to improve mathematical articulation. I have also been in touch with the State Education Department and have received comparable assurances, as well as from the SUNY Provost, Peter Salins.

Some of the activities and outcomes that I envision for this initiative are:

1. A working group will be created with representatives from each of the three professional organizations, as well as representatives from the secondary schools.
2. The working group should organize a statewide conference on the articulation under the sponsorship of the professional organizations and the SUNY Chancellor's office. Hopefully, representatives (say two mathematicians and one administrator) of all public and private colleges in the state would participate. This conference would serve several purposes. First, it would raise the articulation issue before a wide audience and sensitize them to the problems. Second, it would forge connections between individuals at different post-secondary institutions, the high schools, the appropriate state-wide agencies, and some of the national organizations such as ETS. Third, it would provide the opportunity to develop detailed plans for how to proceed to make the mathematical transition between high school and college, and between two year colleges, four year college, and universities as seamless a process as possible.
3. One specific outcome of this initiative might be the development and testing of a special placement test, reflecting the actual secondary mathematics curriculum in New York State; this test could then be made available to all colleges in the state. This is likely a very expensive operation, particularly if, as I envision it, it would be developed collaboratively between mathematics faculty and an organization such as the Educational Testing Service.
4. From the perspective of the SUNY University Centers and many of the private colleges in the state, a significant proportion of their students come from other states and the issue of identifying the kind of mathematical backgrounds those students bring is something that needs attention.
5. Testing vehicles such as the rising junior exam or collegiate exit exams may change to reflect the mathematics that students have learned.
6. Some college mathematics departments may begin to rethink their math offerings to better reflect the new Course A and Course B that are replacing the Sequential Math program.
7. A broader spectrum of the college mathematics community may have the opportunity to have some input into what is happening in high school mathematics.

Certainly, if we can ease the mathematical transitions of the students in New York, we would be making things better for all of us. The students will be better served when they arrive on campus; enrollment in "remedial" courses may actually diminish because many of the students being placed there may not really need remediation; enrollment in college-level mathematics offerings might even increase. The students, faculty and administrators will all be happier. All we need are some willing volunteers to make these things happen.