Policy Issues Regarding Alternative Developmental-to-Transfer-level Mathematics Pathways

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At the Fall 2012 plenary session, three resolutions were brought forward asking the body to endorse a particular curriculum pathway in developmental mathematics. In various discussions, there were a number of questions raised about what mathematics professional organizations like the California Mathematics Council Community Colleges (CMC3) and CMC3–South think about the innovation, what implications the innovation might have on existing policies and regulations (e.g., the graduation competency requirement in mathematics) and transfer agreements with four-year universities, and whether the Academic Senate should even take positions on particular, within-discipline curriculum initiatives. The body referred the resolutions to the Executive Committee until such a time that the mathematics professional organization can weigh in. The purpose of this article then is to address the last two questions.

Perhaps it is most useful to consider the general question first: what role, if any, should the Academic Senate take upon itself in relation to curricular innovations within a particular discipline or field? A review of existing resolutions reveals that the Academic Senate generally takes positions on broad issues and procedures related to curriculum as a whole, but the body has been hesitant about taking positions within a subject. That’s not to say that Senate has never taken such positions; it’s just that when considering the totality of resolutions, we’ve largely been content to leave curriculum and instructional choices to subject matter faculty. When the body has taken such positions on curricular innovations in a discipline, it is often to disseminate information (e.g., 13.01 (Fall 2011) *Coordinating a Model of Basic Skills Instruction Through Implementation of the ERWC*) or to support research in various curricular approaches (e.g., 9.07 (Spring 2000) *Mathematics—Global Approach*), not to endorse one approach over others. Indeed, endorsement or advocacy of a particular curricular approach would go against long standing Academic Senate positions supporting local decision-making in matters of curriculum and instruction.

The Academic Senate does, however, take positions on graduation requirements and transfer procedures, especially in regards to certification of basic skills competency in reading, writing, and mathematics. In part, this is due to the unique place that community colleges hold in the educational system. In order to graduate from high school, students must demonstrate a certain level of proficiency in these key subjects, and virtually every four-year college and university sets specific reading, writing, and mathematics entrance requirements. Situated between these two systems, California community colleges, as open access institutions, do not have entrance requirements, but students are expected to attain these fundamental skills prior to graduation. For this reason, Education Code and Title 5 regulations specifically require reading, writing, and mathematics competency for all degrees. For community college students seeking transfer, our four-year partners have similarly set an expected level of reading, writing, and mathematics achievement. And, over the years, the Academic Senate for California Community Colleges, as the faculty voice on academic and professional matters, has taken numerous positions on expectations for reading, writing, and mathematics to ensure students are prepared for college-level work. But what if a curricular innovation butted up against, or called into question, existing policies, regulations, and Senate positions related to mathematics (or reading or writing) proficiency? That is precisely the situation embodied by the resolutions which were referred at the last plenary session.

**Developmental Math: Pump or Filter?**

In the late 80s, the calculus reform movement began with the publication of a series of papers entitled Calculus for a New Century: A Pump, Not a Filter. The central thesis of the book was that the calculus sequence as taught at the time wasn’t increasing the number of Science-Technology-Engineering-Mathematics (STEM) graduates. Instead of a serving as a pump, enticing students into the field, it was acting as a filter, keeping students out. A similar argument has been made about the developmental mathematics sequence. Year after year, data show that many students struggle to complete the developmental sequence of math courses at community colleges. Reformers point out that, for those starting in the lowest level of mathematics (arithmetic or pre-algebra), research indicates that the likelihood of students reaching a college-level mathematics course is dauntingly low. They conjecture that each enrollment in a remedial course offers another chance to fail, an exit-ramp rather on-ramp.

As a possible innovation, reformers propose that the number of remedial courses be reduced. This suggestion, in and of itself, is not problematic from a policy point of view as long as the topics being taught are essentially the same. Discipline faculty are always tinkering with the number of course units, the appropriate lab-lecture ratio, and the number of courses in a given program sequence. What does propose a challenge from a policy point of view is when reformers, in order to compress the developmental-to-transfer pathway, take the additional step of omitting topics from the current developmental sequence. For example, the three-course sequence *Beginning Algebra-Intermediate Algebra-Statistics* is a common developmental-to-transfer pathway for non-STEM students needing a transfer-level mathematics course. As a compressed, alternative pathway, experimental projects like StatWay and StatPath employ a two-course sequence in which a non-transfer preparatory course in statistics and algebra is followed by a transfer-level statistics course. Only those algebra topics directly needed to understand statistics are included in the experimental sequence.

**Policy Concerns**

Why would such a curriculum innovation create policy concerns? There are at least three different areas in which omission of algebra topics is problematic from a policy point of view:

1. ***Conflicts with Title 5 mathematics graduation competency requirement.***Specifically, Title 5 §55063 defines graduation competency in mathematics as “obtaining a satisfactory grade in a mathematics course at the level of the course typically known as Intermediate Algebra (either Intermediate Algebra or another mathematics course at the same level, with the same rigor and with Elementary Algebra as a prerequisite…) or by completing an assessment … and achieving a score determined to be comparable to satisfactory completion of the specified mathematics course.” The prep course in the two-course sequence described above is not equivalent to Elementary Algebra because it includes only those algebra topics deemed necessary for statistics. Thus, at least under a literal reading of Title 5, the transfer-level statistics portion of the experimental sequence doesn’t meet the graduation competency requirement in mathematics as presently written. Furthermore, some people might question whether students held to the requirements for an AA or AS degree are held to higher standards than students preparing to transfer with the new curriculum.
2. ***California community colleges may be sending a mixed message to high school students.***
At the high school level, the new national Common Core State Standards (CCSS) for mathematics require knowledge of the topics normally taught in Beginning and Intermediate Algebra at our colleges. The CCSS expects all students to acquire this level of mathematical understanding, even for students pursuing non-STEM careers; the CCSS has even higher mathematical standards for those planning to pursue STEM fields. Relatedly, the Academic Senates of the California Community Colleges, the California State University, and the University of California have jointly adopted a set of mathematics competency standards at a similar level of rigor with regard to needed algebra knowledge for college-level work. If community colleges offer a developmental-to-transfer-level pathway that is shorter and reduces the content expected to be learned, students may choose not to work as hard in high school to master all mathematical topics because they know there is a “Plan B” for them available at the community college. Given these realities, community colleges find themselves in a sticky political situation. If the new curriculum is adopted, all students, except community college students, will be held to similar standards with an expectation of learning the traditional developmental algebra sequence. If a student goes to community college, then the expectations will be different, and the student will not be required to learn Pre-, Beginning or Intermediate Algebra. Such an eventuality would weaken high schools’ efforts to help students meet the CCSS.

Additionally, Elementary Statistics may be taken in high school as an Advanced Placement (AP) course. The AP course also requires students to successfully complete Intermediate Algebra prior to enrolling. The point of AP courses is to model college curriculum so that students can receive undergraduate credit, but the prerequisite for the high school AP course will match the university courses and be higher than for those CCC students in the experimental statistics sequence.
3. ***Potentially creates friction in articulation processes with the California State University and University of California.***The CSU has a policy (CSU Executive Order 1033) that states that all mathematics courses in the quantitative reasoning general education pattern must have an explicit Intermediate Algebra prerequisite, and UC requires that all transfer level mathematics courses have Intermediate Algebra or equivalent as the prerequisite to the transfer level course (UC Transfer Course Agreement (2012). Because the experimental prep course for statistics described above is not equivalent to Intermediate Algebra, the articulation of the transfer-level portion of the sequence cannot be made without some type of waiver or other special consideration. For a limited number of California community colleges on a pilot basis, CSU is allowing the transfer-level course in the sequence to articulate for a period of time while data on the effectiveness of the course are collected. UC plans to evaluate each of the courses on its merits using their existing processes for articulation.

 **Some Ways Forward**

As decided at the Fall plenary session, the resolutions related to the accelerated developmental-to-transfer-level statistics pathway will be deferred until the professional CCC mathematics organizations have a chance to study the innovation and provide us with their informed opinion of it. Regardless of what they determine with regards to the curriculum itself, the policy concerns remain and will have to be addressed if this particular experiment is to continue and expand. Some possible approaches to the policy challenges include making no policy changes at this time, perhaps redefining the mathematics graduation requirement in Title 5, or once the new curriculum meets all other challenges, creating a marketing and messaging blitz to high school students, teachers, administrators, university partners, parents of K-12 students, and the public in general explaining the different standards for mathematical competence at community colleges. Creative thinking will be needed to resolve the policy conundrum raised by the new curriculum and the challenges it poses for students navigating the system.

**Conclusion**

Curriculum innovation and experimentation are challenging activities even in the best of circumstances. There is typically a certain amount of institutional resistance to change. The innovator must be an advocate of the particular approach in order to attempt the curricular experiment in the first place, and, at the same time, a skeptic, recognizing that the work that he or she is doing is a trial and may not work. In the case of the experimental developmental-to-college-level statistics sequence, the work is even harder as there are a number of policy issues that must be addressed simultaneously. While the Academic Senate has historically limited its involvement in curricular issues occurring within a discipline, typically deferring to professional organizations on matters of subject matter and pedagogy, the Academic Senate does have an ongoing interest in larger statewide educational issues like graduation and transfer. Thus, faculty, beginning with those in the discipline of mathematics but expanding to all concerned about standards and student success, must continue to debate and thoughtfully consider the best solutions for all stakeholders.