

CASE STUDY

Curriculum Assessment; Division of Integrative Studies (General Education)

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Meeting of the Math Minds

In response to previous evidence that identified that certain students were struggling in Mathematics, specifically with basic Algebra skills when assessed in all Math courses pre-2014 on a (40) question elementary Algebra exam administered by NewSchool instructors in their Math courses on the first day of class, and in response to concern from Physics, Statics, and specifically Structures instructors that there may be a “gap” in basic Algebra and Trigonometry skills among some students; all Math instructors were brought together to examine and evaluate potential shortfalls. The initial *Meeting of the Math Minds* took place on January 31st of 2017 and included the following goals:

- Close examination of all syllabi and course learning outcomes
- Examine Math sequencing in all programs
- Peer to peer discussion by instructors about concerns, complaints, and a discussion of perceived student achievements and shortfalls
- Identification of gaps and overlaps within the current mathematics curriculum
- Study of grade distribution over a three year period: 2014, 2015, 2016 of students in Mathematics courses disaggregated amongst students

who were low achieving and/or failing upper division courses such as AR 321 Structural Systems I

- Recommendation from Math instructors on specific changes, improvements, and/or supports which could be implemented to improve student learning and achievement of lackluster Math skills.

A follow-up *Meeting of the Math Minds* took place on March 2, 2017 and concluded with the following recommendations:

- Ensure appropriate math pre-requisites and transfer credits are included on all transfer guides with community colleges
- Recommendation that Interior Design align with Product Design and include Geometry in its mathematics sequence
- Recommendation that Bachelor of Construction Management should investigate including both Intermediate Algebra and Trigonometry in its Math sequencing in order to ensure students are better prepared for Physics and Structures sequence.
- Continue to bring together instructors from both Integrative Studies and the majors in order to better align basic math courses with discipline courses such as structures, statics, and environmental systems.
- Focus on core concepts as Math instructors must address the limitations of teaching a 10 week curriculum.

Summary of findings

The bringing together of both Integrative Studies instructors and instructors from the various majors was paramount for making meaningful changes to the syllabi, curriculum, and emphasis of core concepts. It also helped to promote a better overall understanding of student skill levels and shortfalls. These initial discussions and hypotheses were further supported when the Manager of Institutional Research was asked to procure data that outlined the grade distribution of students in Algebra, Trigonometry, and AR 321 Structural Systems I which is the first structures course taken in sequence for both Architecture (Arch) and Construction Management (CM) students.

A total of 342 Arch students and 24 CM grades were graphed. We wanted to see whether or not students who both took and did well in Math 171 and 172 also did better in AR 321. Although grades may be an indirect measurement of meeting specific course and program learning outcomes; we felt that the quantifiable nature of math quizzes and exams would provide a good baseline of insight. The results highlighted the concerns of the Math instructors who during the meetings hypothesized that some students lacked the basic Algebra and Trigonometry skills necessary to be successful in AR321. It turned out that the relationship was directly proportional. Students who did well in Algebra and Trigonometry (received an A or B) also did better in AR 321 usually receiving an A or B at about 75%, relationally. Further, Architecture students who are required to take both Intermediate Algebra and Trigonometry did better overall in AR 321 with 62% receiving A's and B's and 23% receiving C's and 15% receiving a D or F. Conversely, Construction Management students who were not required to take Intermediate Algebra or Trigonometry did worse in the same AR 321 course delivered by the

same instructor with 42 % receiving A's or B's, 38% receiving C's and 21% receiving a D or F.

When we disaggregated further we identified that transfer students in CM who had taken Algebra and Trigonometry prior to attending NewSchool did better in AR 321 and accounted for most of the CM students who received the A's and B's in AR 321. Finally, it was noted that freshman students who had not taken any Algebra or Trigonometry at the college level were a cohort who was most likely to be at risk of success in AR 321. Though this cohort was small (approximately (10) first-time freshmen enrolled in CM at the time of writing this report); it is important to strategize how to mitigate the risk for these students. Additionally, the stratification of faculty concerns and student performance led to the recommendation that the CM program reconsider its Math sequencing.

The recommendation for the School of Design School to add geometry to the Interior Architecture Program sequencing was not supported with data or evidence but rather a general recommendation by the Mathematics and Science SME's that all NewSchool students and programs benefited from Geometry. This recommendation has been implemented.