

Weber State University Developmental Mathematics Program Review
By Andrea Garavito Martinez, Suzanne Mozdy, & Patrick Saxon

Programmatic Nature of Developmental Math (Faculty)

The foundational math skills learned in the developmental math program are necessary for a successful college career. Learning math as an adult is much different than learning math as an adolescent as it carries anxiety and sometimes a bit of shame. Additionally, it needs faculty trained in teaching the foundational math concepts to students who have, more than likely, seen the concepts more than once before and have not been able to learn them. Because of this, it takes a specially trained individual in foundational math and math andragogy. Faculty focused on the teaching and learning of these students and focused on scholarly learning, research, and assessment will support students who come underprepared in mathematics. Because Weber State University (WSU) developmental mathematics is a program and not a department it is on unequal footing with all departments in the school, most specifically the mathematics department.

Recommendation: The program should become a department completely housed in the College of Science under Dean Dr. Andrea Easter-Pilcher. This would streamline support and services necessary for success in collegiate mathematics and enable the math and developmental math departments to work more closely to increase student success. This is especially important in light of the institutional goal of becoming a Hispanic Serving Institution. Ethnic minority students are likely to be overrepresented in developmental education (Saxon, Slate, & Barnes, 2016). Improvements to instruction and support in developmental education will likely lead to improved outcomes for these students.

Recommendation: With the change to departmental status, the faculty are moved from the non-tenure track to the tenure track faculty lines over several years, thus requiring higher credentials, preferably a Ph.D. in mathematics education, and the requirement of scholarship in their field as it pertains to learning mathematics. Current full-time faculty are given the opportunity and time to complete their Ph.D. work in mathematics or mathematics education. Page 21, Appendix B of the self-study indicates that only one adjunct (the current program director) holds a Ph.D. All other instructors (contract/adjunct) are either master's or bachelor's level.

Recommendation: The budget is in the College of Science under the administration of the Dean Dr. Andrea Easter-Pilcher. This will enable the Dean to better support the efforts of the department to build foundational math skills.

Recommendation: Focus hiring on diverse faculty to enable the ratio of diverse students to start approaching that of the faculty. Under Standard E - Faculty, the program instructors are 100% White/Caucasian. This does not reflect the demographics of students enrolled in foundational mathematics at WSU.

Cohesiveness of Program (Student Learning Outcomes/Assessment)

The idea or goals of assessment of the program, individual faculty, and student success was not singular. It seems like all faculty were engaged with some sort of self-evaluation and reflection

on their teaching but not on assessment strategically and holistically as a program. Additionally, it was not clear that full-time faculty knew how or where to access data for assessment. Nor was it immediately obvious that there was a common goal (high-yield indicator) for assessment within the program. It seemed that communication of the assessment and five-year review was not available, shared, or viewed by the contracted full-time faculty. The faculty also felt that they were bearing the weight of student failure and that the narrative of the “at-risk” students’ success was solely the problem of the developmental math program. This weight seems to be the point of exhaustion and frustration for many full-time contracted faculty.

Recommendation: The program has a common goal (benchmark) for assessment that is related to the mission and vision of WSU and that directly supports student success.

Recommendation: The full-time faculty are trained on how to access, analyze/interpret, and/or generate data for assessment.

Recommendation: All faculty are made aware of the results and there is a common goal to address the outcomes of the assessment.

Recommendation: The assessment focuses on rewriting the narrative of developmental math being a place where many failures happen and the only place to make the at-risk student successful.

Equity, Diversity, and Inclusion Lens to Data (Student Learning Outcomes and Assessment)

As described above, contracted full-time faculty did not know how or where to find institutional and/or program data, this includes DFWI data disaggregated by race/ethnicity, gender, and other characteristics. During the visit, multiple comments were made that the Developmental Math program served a large number of minoritized students. The Developmental Math Advisor and Director did mention that they have a significant number of minoritized students in their developmental math courses. Race/Ethnicity demographics of faculty and adjuncts were available in the program’s self-study but students’ demographics were not made available to the reviewers. However, data on this student population’s demographic was not known, analyzed, or interpreted by the contracted full-time faculty and adjuncts.

Contracted full-time faculty and adjuncts mentioned the existence of *Starfish*. It appears that WSU has an early indicator warning system named, “*Starfish*.” As described on their website, *Starfish* is a technology tool that supports student success by facilitating communication and connection between faculty, students, advisors, and support services. The contracted full-time faculty and adjuncts described utilizing this system to raise “flags” for off-track students - attendance, missing/late assignments, low quiz/test scores, in danger of failing, etc. While some faculty described reaching out to students via email and messages before raising a flag, the majority of full-time faculty and adjuncts described not knowing “where the flag” goes once it is raised. A note was made that students that are part of the *Wildcat Scholars* program have the alert of a “flag” sent to their program advisor (“Jesus”) and developmental math advisor. Nevertheless, for students not in this learning community, there was confusion on what advisors

(the Developmental Math advisor or academic advisor) receive the flag alert and who is responsible for the follow-up or what types of additional supports are to be given.

Recommendation: Using an equity-lens approach to the data begins with understanding and analyzing the DFWI rate. The DFWI rate is the percentage of students in a course or program who get a D or F grade, withdraw (“W”) from a course, or whose progress in the course is recorded as incomplete (“I”). A critical examination of the DFWI rate is an immediate and often illuminating step toward creating meaningful change for minoritized students. Along with training faculty on how to locate the data, we recommend doing a yearly review of program-level data (e.g., DFWI) through an equity lens. This means disaggregating the data by race/ethnicity, gender, and other indicators. Additional indicators can be determining and identifying students that have completed the same course multiple times. An Adjunct mentioned working with a student that it was their seventh time taking the same math course and not being able to pass it. A recommendation is to see how many students have taken the same math course and not passed. Moreover, disaggregating DFWI rates can help identify what instructional practices or elements within a course are addressing or creating barriers to equity for minoritized students

Moreover, it appears WSU has an effective EWI (Early Warning Indicator) data system that provides clear, accurate information about “high-yield” indicators. High-yield indicators—especially attendance and course performance—are highly predictive. EWI data effectively identify students in need of additional interventions, faculty and program director must effectively organize and identify how to leverage on-campus resources to meet the needs of “off-track students.” *Starfish* is the tool used for monitoring and data is available. We recommend additional training for faculty and staff on how to utilize Starfish and its connection to DFWI and embedding and integration of services to support teaching excellence and student success (described below).

Alignment to eHSI Strategic Plan (Relationships with Communities)

The program self-study provided to the reviewers or meetings with multiple stakeholders (e.g., faculty, staff, adjuncts, students, and/or campus partners) did not provide specific mention or information on the university’s Amplified 5-year strategic plan to become an Emerging Hispanic-Serving Institution by growing the percentage of students who identify as Hispanic or Latino descent to 15% by fall 2025. However, multiple times it was mentioned (no data provided) that the developmental math courses serve minoritized students, where Hispanic/Latino students are the majority. Thus, any effort to increase the enrollment of Hispanic/Latino students to WSU must include conversations on their math placements and the wrap-around academic support needed that will yield academic success.

Recommendation: Developmental math can be a gatekeeper for Hispanic/Latino undergraduate students. Research indicates that Black and Latino/Hispanic students are more likely to be assigned to developmental courses than White students. It is important to understand systematic barriers before college that contribute to this overrepresentation beyond cultural attributes. The number of enrolled and passing rates of Hispanic or Latino students in developmental math courses were not made available to the reviewers. To move towards meeting WSU’s strategic plan, we recommend: (1) identifying the number of Hispanic/Latino students and their DFWI in Developmental Math, (2) training and preparation for faculty, adjuncts, and staff on the

experiences and success of Latino/Hispanic students in developmental math courses and successful models, and (3) collaborate with multiple campus partners to help Hispanic/Latino students to identify and understand their math pathway.

Online Math Instruction (Curriculum/Faculty/Student Learning Outcomes and Assessment)

The reviewers spoke to only one student taking a math course online. This informed our description and recommendations for online math instruction. If it is believed that this one experience does not correctly represent online math instruction, perhaps additional qualitative examination is needed.

The student interviewed described an isolated learning experience in their online class. They did not know any other students in the class or the size of it. The course was self-paced with elements of computer-assisted and Mastery Learning. The learning system (named “Pearson”) was characterized as inflexible and sometimes difficult to navigate. The instructor of the class advised the student that supplemental content could not be uploaded to the Pearson platform—though that point was challenged later by a faculty member who suggested that it could. The student claimed to have received no orientation or training in online learning or the technology used to provide it. Finally, this student stated that they often needed to find their own learning support when needed and often found that assistance at a tutoring center on another campus.

It’s quite commonly reported in the research literature that developmental instruction conducted online consistently yields substantially lower student success rates than traditional class instruction (Jaggars & Xu, 2010; Smart & Saxon, 2015; Xu & Jaggars, 2011). Unfortunately, it seems lower success rates are to be expected. Therefore, extra effort must be taken to support students in this environment.

Students in online courses need to receive additional guidance on skills and behaviors that promote their engagement with the course content, the technology that is being applied to teach it, and the instructor. They also need to possess an understanding of when they need assistance with their learning, and the volition to seek it promptly. It cannot be assumed that students in developmental education, or for that matter, those in their first year of college routinely exhibit these behaviors. It’s therefore important to teach them, encourage them, and make support overtly available for these students.

Recommendation: Assess and screen students for their ability and motivation to participate in an online mathematics course before approving their enrollment in an online section. Advising should be mandatory for online students. Technology support and training should also be available to students.

Recommendation: Offer learning support online. Online math tutoring should be provided with well-publicized hours and available scheduling in the Learning Management System.

Recommendation: Vary instructional methods online. It appears that the online instructional model being employed for developmental math is self-paced and computer administered. The classes could likely benefit from structured learning progression and more engagement with the

instructor and fellow students. When new content is introduced, perhaps the instructor could engage the class in small groups in synchronous meetings to discuss the content and offer support. Students who are struggling may benefit from being required to attend such sessions. Students might also benefit from collaborative learning whereby they are occasionally assigned to do projects/problems with their fellow students in the class. The students may also benefit from the instructor adding more of their presence and teaching style to these courses. Providing custom videos and other content, discussion forums, and routine office hours may be helpful to students.

Recommendation: Due to this trend, we recommend focusing on improving course delivery methods for online-only developmental math courses. In particular, how to meet the needs of minoritized students and students with disabilities. A student mentioned having a difficult time accessing and understanding their math online-only course due to the faculty's engagement and course set-up not being "student-friendly." We recommend offering a stipend for contracted full-time faculty and adjuncts to complete a WSU Online eLearning Certificate.

Recommendation: It was mentioned that only full-time faculty are allowed to teach online (asynchronous courses). Adjunct faculty should have the opportunity to teach courses beyond face-to-face, to hybrid and online courses.

Recommendation: Collaboration with the Teaching Learning Forum (TLF) and the Developmental Math program is needed to identify the types of courses, training, and recourses that are relevant to their needs. Based on data shared by the director, about 30% of students are in online classes (not including the few synchronous virtual classes). There were 890 students in online courses and 2949 students in the total department for the full year. For the summer, two sections for MATH 950, MATH 990, and MATH 1010. In the Fall/Spring, two sections of MATH 990 and 3 sections of MATH 950 and MATH 1010. This is a significant data point because it aligns with the national trend in colleges/universities that shows a growth in online enrollment.

Adjunct Faculty (Faculty)

The adjunct faculty provided a positive and pleasant description of their roles and support at WSU. They enjoyed their work and felt supported with their teaching. A full-time faculty member expressed that adjunct faculty "tend to stick around." Perhaps this means they are satisfied with their work. A few challenges were noted that are likely easy to address. It was mentioned that they are rarely invited to events such as faculty meetings, campus events, and professional development opportunities. They also mentioned that they did not have office space from which to host meetings with students. This was the only request they felt was important to make—assigned office space. Datray, Saxon, and Martirosyan (2014) described similar challenges with adjunct faculty teaching developmental education courses. These challenges contribute to the marginalization of these faculty.

Recommendation: Give the adjunct faculty their own office space. It is important to them and their students that they have a workspace in the campus community.

Recommendation: Invite adjunct faculty to attend faculty meetings and campus events, and provide support for them to engage in professional development offered within the institution. If

they are not paid to engage in such activities, do not require them to attend. However, these invitations may help them feel as if they are more a part of the campus community, and promote more collaboration across all of the developmental math faculty.

Integrated Student Success Supports (Support)

In this section, we will talk about the importance of embedding and integrating services that support faculty teaching excellence and student success.

Teaching Excellence

All faculty and staff mentioned being passionate about teaching and working with students and seeing them succeed. They discussed making changes to their instruction after seeing passing/failing rates. However, comments were made that they just didn't know what else to do because "these students never learned how to be successful" and "they do not know how to do college." Faculty described a sense of frustration and emotional toll of working with students in developmental math. They described students arriving with multiple deficits and being behind. In particular, spending time trying to show students how to do school. One faculty member stated, "we bend over backward. They are just not ready to be college students." When asked about participating in the on-campus and in-service professional development, the faculty and adjunct described the offerings through TLF as irrelevant for Developmental Math. Faculty did mention attending national conferences to stay up to date on content and the field of developmental math. However, they did not mention any additional resources or services provided by WSU to improve their instruction and/or being provided with support on how to engage and support the types of students they have in their courses (with their academic level). In conversations with the director, the faculty were invited to participate in a book club and the ACUE Inclusive teaching for Equitable Learning course. It was unclear how many faculty and adjuncts participated in the book club or ACUE course and what changes were made to their pedagogy and/or course content.

Recommendation: Teaching developmental math with a large number of culturally, racially, and linguistically diverse students can be challenging. However, it is important to reflect on and address educators' beliefs and biases. Research has shown that when educators solely focus on students' apparent deficits can leave them feeling helpless, frustrated, or angry because it implies that the only possibilities for change are outside of the educators' control (Hood, 2022). All faculty must be able to understand and identify the assets of their students through a Culturally Responsive Teaching Framework. The Culturally Responsive and Sustaining (CR-S) Framework outlines four principles and embedded strategies to help educators create student-centered learning environments that: affirm racial, linguistic, and cultural identities; prepare students for rigorous and independent learning; develop students' abilities to connect across lines of difference; elevate historically marginalized voices; and empower students as agents of social change. A recently published dissertation by Thomas A. Mgonja from Utah State University examined the use of Culturally Relevant Pedagogy in undergraduate mathematics learning modules with Students of Color. In particular, it was focused on developmental math courses. Since there is a large number of minoritized students in the Developmental Math program, we recommend providing all faculty and adjuncts with specialized professional development on how to integrate culturally responsive pedagogy and how to operate through an asset-based approach.

Student Success

All faculty were able to identify the Developmental Math Advisor/Learning Specialist and on-campus tutoring center in the College of Science and the test proctoring locations as resources for students. Reviewers had an opportunity to meet with various campus partners and listen to multiple programs, initiatives, and resources available to support the student population that is served through the Developmental Math courses. This included:

Eric Amsel, Associate Provost
Carl Porter, Executive Director, Academic Support Services & Programs
Amy Huntington, Wildcat Scholars, and Learning Communities
Robert Wolfley, Director of Veterans Services
Jonathan Zempster, Math Tutoring Coordinator
Matt Ondrus, Professor of Mathematics
Ryan McGinn, Asst. Athletics Director for Student-Athlete Academic Services
Shawn Broderick, Assoc Professor of Mathematics
Tracey Smith, Director of Testing Services
Shawna Werner, Asst Director, Disability Services
Brady Rae, Advisor & Classroom Accommodation Specialist, Disability Service

When visiting Math 810, the instructor, director, and advisor mentioned that it was a collaboration with the *Wildcat Scholars* program. One faculty member did describe teaching a section that was part of the Wildcat Scholars program and only 3 out of the 13 students passed the course. This faculty member mentioned contacting the program coordinator and advisor about the students in danger of failing but did not feel they were provided with sufficient or additional support on how to best support the students. Nevertheless, the majority of contracted full-time faculty and adjuncts did not know the purpose, mission, and goals of this program beyond knowing that it existed and a class was provided to help those students with Aleks testing. When asked if the faculty/adjuncts knew what students are participating in the Wildcat Scholars program, the advisor mentioned that they do not disclose that information due to concerns of bias and labeling of students.

Recommendation: Due to the short amount of time allocated, we recommend for future review scheduling additional time or one-on-one meetings with the various campus partners. In addition, we recommend allocating time during faculty meetings or the yearly faculty retreat for these partners to be invited to share the types of services and resources they offer to students that are served through the Developmental Math program. A list of available resources can be shared with current faculty and adjuncts.

Recommendation: Increase understanding and training for all faculty and staff about the Starfish Progress Surveys on how it is a tool to streamline means for faculty to give feedback to students on course performance and/or attendance. When raising “flags,” faculty can help keep students informed of their progress and achievements and prompt them to action if needed. This tool when utilized can help prioritize and coordinate outreach for students; especially for the most vulnerable students. It is very important to understand how to connect students to the available resources on campus. A flow chart on the referral process - raising the Starfish and follow-up actions - can be shared with current faculty and adjuncts.

Recommendation: While the concern of bias and labeling of individuals is valid, the practice of non-disclosure from the Developmental Math Advisor to Faculty about the possibility of having Wildcat Scholars in their classes is not a common practice across the university. The Wildcat Scholars Program is a learning community that has purposefully designed courses that help students build a solid foundation for college success. The eligibility for this program is only based on Math Placement 1, 2, or 3 AND an English Placement 1 or 2 (see website: <https://www.weber.edu/wildcatscholars/apply.html>) and not on being part of a protected class (e.g., disability, veteran status, etc.). According to the website, they offer a welcoming support network to students as they transition into college through comprehensive financial, academic, and personal support. Inviting faculty to learn about their students and if they are part of this learning community is key to developing positive and professional relationships. Faculty and adjuncts can be trained on culturally responsive ways to inquire about students' backgrounds to leverage resources. For example, a faculty member knowing about a student's participation in a learning community can be beneficial. The faculty member can encourage them to reach out to their program mentor/advisor if they are facing any challenges academically. This can be done by posting/sharing information about the Wildcat Scholars Program's services, resources, and events with all students via Canvas messaging or announcements.

Support (Advising)

From our review, it appeared that advising resources are quite scarce. This is unfortunate given the importance of advising for first-year and developmental education students (Boylan, 2002). Perhaps an evaluation of how best to apply what advising resources are available is in order. As noted throughout this report, advising can assist with placement, student support, and online course placement and enrollment. Advisors are also important in helping students with acclimation to college and can be pivotal in helping students find the types of support they need to keep them engaged with the college and their classes. The need for advising resources cannot be overemphasized.

Recommendation: Investigate and experiment with group advising during orientation and the FYE course. Train the advisor(s) to assist students in considering their math placement (i.e., speak with them about affective challenges to math). Train them to assist students who are considering online courses.

Recommendation: If you have a grant writer or interested party in this area, write a Title III Strengthening Institutions grant to seek funding for an Achievement Coaching program. Reviewer Saxon has worked with another college to fund, administer, and evaluate a Coaching program that ultimately has provided great benefits to their developmental education students.

Math Placement (Student Learning Outcomes and Assessment)

It appears that not all students receive a math assessment and placement decision at the outset of their enrollment. A few faculty suggested that some students can matriculate quite a way through their curriculum before facing a developmental math placement and enrollment.

Recommendation: All students should be referred to advising in their first semester, for a math placement determination. The placement can be done either through skills assessment testing and/or informed aptitude assessment, along with noncognitive assessment. Noncognitive assessment should include some measure of math anxiety and time-on-task assessment for engaging in math courses and content. All or parts of this process could be done through advising and assessment, and integrated with the FYE course and/or orientation if helpful.

Late Enrollment in Developmental Math (Curriculum)

It was noted that late enrollment into developmental math classes is common. No data were provided on the extent to which this occurs, nor was there any assessment of the amount of class time students miss by enrolling late. However, late enrollment in developmental math is ill-advised due to the progressive nature of a mathematics curriculum, the number of students that need these classes, and the challenges in getting students prepared for college math promptly. Time on task is important, and late enrollment not only reduces time on task, but it also sends the wrong message to students about the importance of class attendance.

Recommendation: Late enrollment should not be allowed for developmental mathematics classes.

ALEKS Skills Assessment Retakes (Student Learning Outcomes and Assessment)

It seems students can retake the ALEKS as many times as they want to place into college math. Faculty also noted that a course that was dedicated to preparing students for these retakes. The description sounded like a lesser-organized modularized math course whereby students can proceed in brushing up their skills at an individualized pace. Faculty also noted that they once had a more organized modularized math curriculum that wasn't very successful. No data were provided on the number of retakes or the subsequent performance of students as they engaged in more retakes.

Perhaps some inquiry into this model is in order. Is this a carryover from the former modularized math program? If so, why continue to do this if it wasn't initially effective? Furthermore, if ALEKS is being used as a skills assessment test, it is ill-advised to allow students to retake the test multiple times to reach the desired placement. As Saxon and Morante (2015) pointed out, a skills assessment test only offers a "snapshot" of student skills at a point in time. It is not intended as a teaching and learning tool. A more effective approach is to advise students about the nature and the importance of the test, allow them some time to brush up on their skills—perhaps in orientation or the FYE course—and then place them according to their skills test scores, and/or aptitude assessments, and noncognitive variables noted earlier.

Recommendation: Study the number of ALEKS retakes that students are engaging in. See if there is any adverse correlation in student learning/success relative to the number of retakes. Take action based on the results. The decision to be made is whether ALEKS is appropriately aligned with the math curriculum and effective for student learning as such that it is working in what appears to be a modularized math model or is it best suited as a skills assessment, providing only a "snapshot" of math skills at a point in time.

Program Commendations

1. The developmental mathematics program administration is to be commended for not engaging with national advocacy groups pushing a “silver bullet” solution for all developmental education students. The program offers varying means for math preparation rather than a “one size fits all” approach to developmental education.
2. The students we met described a math curriculum that was interesting and relevant to their lives and the disciplines they were interested in pursuing. The program is to be commended for what appears to be an effective contextualizing of the math curriculum.
3. The developmental math department and its leadership needs to be commended for its support of adjunct faculty. The adjunct faculty were happy with the mentoring and support provided by course leads (full-time faculty over the course they were assigned to). Additionally, adjunct faculty are open to learning how to improve their teaching and engagement with students.
4. On an administrative level, the developmental math program director and advisor need to be commended for their continuous collaboration with Associate Provost Dr. Eric Amsel and his team over the learning communities, Wildcat Scholars, and Fast Track. In particular, their ability to think “outside the box” to address challenges and barriers that historically marginalized students encounter.
5. We commend the positive relationship with the program’s leadership. All faculty, adjunct, and staff described having strong and positive relationships with leadership.
6. We commend the effective collaboration between the Developmental Math program and the Department of Mathematics in the realignment and redesign of Math 1010. It is evident through the work of the Math 1010 student outcomes and the sharing of teaching classes, that the relationship between the math department and developmental math program has benefitted from the current leadership direction of working together to solve common “problems.”

References

- Boylan, H. R. (2002). *What works: Research-based best practices in developmental education*. Continuous Quality Improvement Network with the National Center for Developmental Education, Appalachian State University.
- Datray, J. L., Saxon, D. P., & Martirosyan, N. M. (2014). Adjunct faculty in developmental education: Best practices, challenges, and recommendations. *Community College Enterprise*, 20(1), 34-47.
- Hood, N. (2022, October 26). *The principles of culturally responsive teaching*. The Education Hub. <https://theeducationhub.org.nz/what-is-culturally-responsive-teaching/>
- Jaggars, S. S., & Xu, D. (2010). *Online learning in the Virginia community college system*. <http://ccrc.tc.columbia.edu/media/k2/attachments/online-learning-virginia.pdf>

- Mgonja, T. A. (2021). *Examining the use of culturally relevant pedagogy in undergraduate mathematics learning modules with students of color*. All Graduate Theses and Dissertations, 8137.
- Saxon, D. P., & Morante, E. A. (2015). Effective student assessment and placement: Most colleges oversimplify the process. *Research in Developmental Education* 26(2), 1-4.
- Saxon, D. P., Slate, J. R., & Barnes, W. (2016). Developmental education reading, math, and writing percentages in Texas community colleges: A statewide, multiyear analysis. *International Journal of University Teaching and Faculty Development*, 5(3), 187-201.
- Smart, B. M., & Saxon, D. P. (2015). Online versus traditional classroom instruction: An examination of developmental English courses at an Alabama community college. *Community College Journal of Research and Practice*, 1-7.
doi:10.1080/10668926.2015.1065777
- Xu, D., & Jaggars, S. S. (2011). *Online and hybrid course enrollment and performance in Washington State community and technical colleges* (CCRC Working Paper No. 31).
<http://files.eric.ed.gov/fulltext/ED517746.pdf>