Northern Arizona University Case Study

Flagstaff, AZ



Study Specifics

School Name
Northern Arizona University

Educator
Gina Marie Nabours, PhD

Course Name
Algebra for Precalculus

Program
ALEKS Math

The Study

Northern Arizona University (NAU) faced persistent challenges in its Introductory Mathematics courses, particularly in MAT 108: Algebra for Precalculus. This prerequisite course, while not fulfilling the Liberal Studies Mathematics Foundation requirement, was crucial for student progression in their academic programs. From the Fall of 2016 to Fall of 2021, **success rates had fluctuated as high as 70% and as low as 62%, leading to concerns among faculty members about student preparedness, engagement, and overall classroom effectiveness.**

Faculty reported several issues, including:

- Difficulty addressing the varying levels of incoming student knowledge.
- Ineffective classroom management.
- A lack of engagement due to repetitive lecture-based instruction.

In response, a team of instructors, including Dr. Nabours piloted the ALEKS Math platform in Spring 2022, seeking a more adaptive and individualized approach to learning that would increase student success and motivation.

Implementation

Choosing ALEKS

The team chose ALEKS primarily for its fully-adaptive capabilities, which allowed for a mastery-based learning model. The platform's ability to assess student knowledge at the outset and tailor content accordingly was particularly appealing. According to Dr. Nabours:

> *"We have students enter MAT 108 at so many levels. Some really need extra support, while others could have placed higher if they had taken our placement test. Using ALEKS in its fully-adaptive form lets students progress quickly or take the entire semester to learn the Topics they need."*

The primary goals of implementing ALEKS were to:

1. Provide better support for students at an individual level.
2. Allow students to demonstrate mastery of topics at their own pace.
3. Increase student motivation and engagement beyond what previous courseware provided.



Course Structure

During the pilot semester, the course was structured around adaptive modules focusing on specific concepts, with students working on related Topics in class and taking non-adaptive exams in ALEKS upon module completion. However, as the course evolved, Dr. Nabours and the faculty embraced ALEKS's adaptive capabilities, implementing a completely open pie structure with comprehensive Knowledge Checks graded based on student progress.

By the latest implementation phase:

- The course comprised 300 Topics.
- Knowledge Check 1 grade based on mastery of 90 Topics (15% of the grade), Knowledge Check 2 on 180 Topics (20%), and Knowledge Check 3 on 240 Topics (20%).
- The final exam was the only Knowledge Check graded out of all 300 Topics (25%).
- Future iterations aimed to reduce the number of Knowledge Checks to just two: a midterm and a final exam, allowing students to take them as many times as needed before the semester's end.
- Students' other grades were based on individualized Topic goals and class participation.

Enhancing Student Support

ALEKS's detailed reporting tools provided instructors with valuable insights into student progress.
Dr. Nabours noted:

> *"I can see how long students have spent in the software, what Topics they worked on, and even how long they spent on each Topic. If I see a student learn a complex Topic in under a minute, I can address potential issues and guide them toward genuine comprehension."*

By using ALEKS's reports, faculty could identify struggling students early, provide personalized guidance, and encourage effective study habits.



Results

Improved Student Comprehension and Engagement

ALEKS's mastery-based approach ensured that students demonstrated real understanding rather than just completing assignments. Faculty observed that students could no longer "pretend" to learn—the platform's adaptive Knowledge Checks required them to retain material over time. As Dr. Nabours explained:

> *"ALEKS has allowed us to see what students truly know. It has also helped us have conversations about study habits and success strategies that support them in future courses."*

Reduction in Grading Time

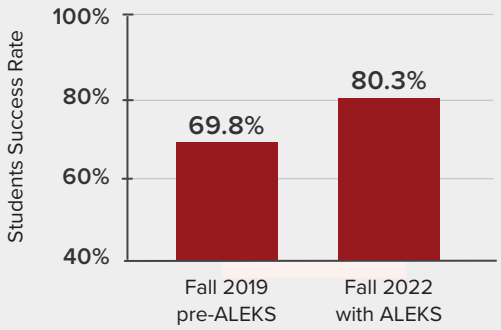
A significant benefit for instructors was the reduction in time spent grading. Instead of manually reviewing math work, instructors focused on supporting students in mastering content.

> *"I no longer grade math work. I focus on helping students learn the material and develop organizational skills for their work, rather than spending hours grading."*

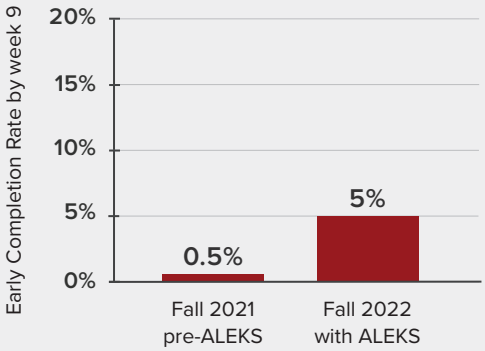
Quantifiable Success

ALEKS had a direct and measurable impact on student outcomes.

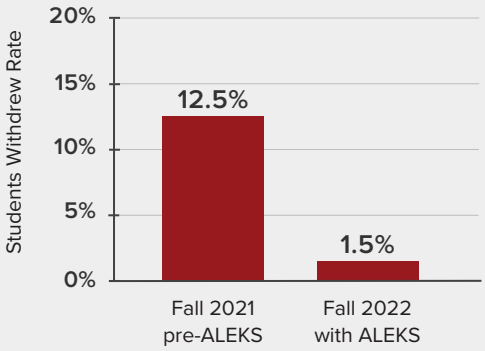
Success Rate Improvements



Increased Early Completion



Reduced Withdrawals



These results demonstrate that ALEKS helped students succeed and significantly enhanced their persistence in the course.

Conclusion

Implementing ALEKS at Northern Arizona University has transformed MAT 108: Algebra for Precalculus into a more effective, student-centered course. By embracing ALEKS's fully adaptive structure, faculty have supported students on an individual level, allowing them to progress at their own pace while ensuring mastery of critical mathematical concepts.

From an instructor's perspective, ALEKS has shifted the role of faculty from lecturers to facilitators, enabling deeper engagement with students and a more personalized approach to learning. Dr. Nabours reflected:

> *"As a teacher, ALEKS has really allowed me to focus on my students as individuals and support them in their success. It required a mind shift for both educators and students, but it's a shift that prepares students for future academic challenges."*

The results speak for themselves—higher success rates, improved student engagement, and reduced withdrawal rates. As NAU continues to refine its ALEKS implementation, the university sets a powerful example for how ALEKS Math can transform mathematics learning at the higher education level.



Instructor Bio

Dr. Gina Marie Nabours is the Director of the Lumberjack Mathematics Center and an Associate Teaching Professor in Mathematics & Statistics at Northern Arizona University. With extensive experience in higher education, she is passionate about first-year student success and fostering a growth mindset in mathematics. Her expertise includes leadership, curriculum development, teacher training, and student support. Dr. Nabours holds a BS in Mathematics, an MAT in Secondary Education from James Madison University, and a PhD in Curriculum and Instruction from Northern Arizona University.

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