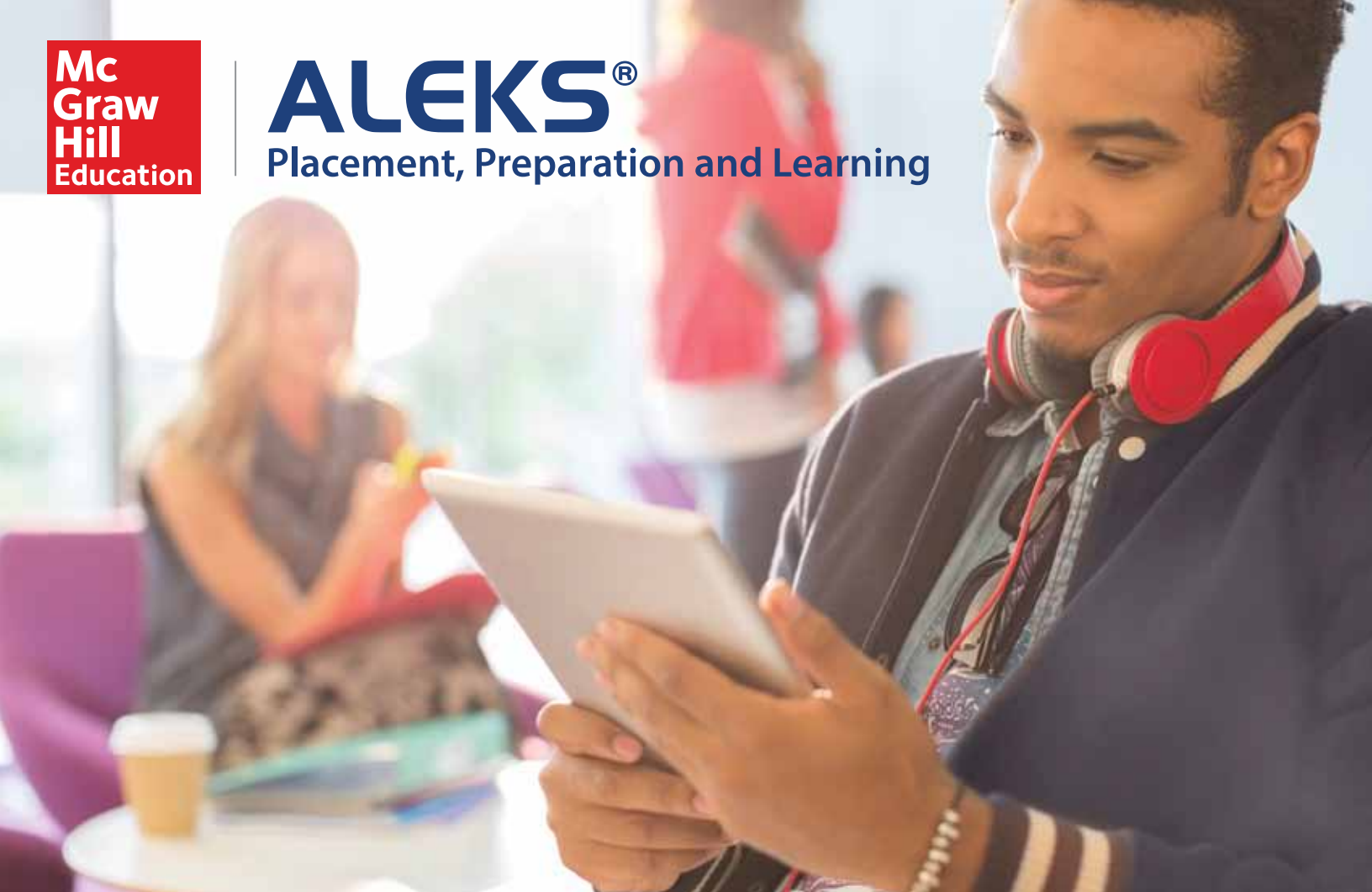




Case Studies and Research Highlights
aleks.com/ppl







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What is ALEKS?

ALEKS is an innovative, adaptive learning system that provides an individualized experience for every student based on their unique strengths and weaknesses. Through powerful artificial intelligence, ALEKS interacts with students like a personal human tutor, delivering the exact instruction they need, right when they need it. The ability to assist students at all levels results in significant improvements in retention, success, and confidence.

ALEKS (Assessment and LEarning in Knowledge Spaces) is the product of more than 30 years of research by software engineers, mathematicians, and cognitive scientists in the application of Knowledge Space Theory. With support from the National Science Foundation, the research efforts by New York University and University of California, Irvine have been transformed into a ground-breaking artificial intelligence engine designed to improve student performance in math.

Why is adaptive learning important?

Every student is different. At the beginning of a course, students have a wide variety of prerequisite knowledge. Identifying each student's knowledge gaps is a luxury that time doesn't allow and a challenge for every instructor. ALEKS has been measuring and analyzing real data from millions of real students for over a decade. By having a deep understanding of each student's learning needs, ALEKS delivers meaningful instruction to students on content they have the prerequisite knowledge to successfully learn. The end result is a dramatic difference in student confidence and motivation.

What is ALEKS PPL?

ALEKS Placement, Preparation and Learning (or ALEKS PPL) is a comprehensive approach to accurately assess and prepare students for success in math courses. With an adaptive, open-response assessment, ALEKS PPL accurately places college students into courses ranging from developmental math through first-semester calculus. The program maps each student's unique knowledge state, then prepares each student for math in a course-specific Prep and Learning Module. As students increase their mastery level in the selected ALEKS Prep and Learning Module, they gain confidence and will be better positioned to enroll in and ultimately succeed in a higher-level course.

What Makes ALEKS PPL Unique

A properly administered placement process places students into the courses in which they belong based on the skills that they demonstrate. Proper placement saves institutions and students significant time and money and is the key element to student success. Many schools currently place students using standardized test scores, or home-grown written or online exams. Unlike ALEKS PPL, these traditional placement methods struggle to place students in the right course and do not offer 6 months of targeted remediation to increase the students' chances of placing in to a higher-level course.

ALEKS PPL differs from traditional placement methods in significant ways:

- Artificial intelligence targets individual student knowledge gaps
- Open-response, adaptive assessment covers hundreds of topics in 30 questions or less
- Seamless transition from placement assessments to precisely targeted learning modules
- Mastery-based learning motivates students to achieve higher placement results
- Online flexibility allows for on- and off-campus testing and simple implementation



To learn more about ALEKS PPL, visit
aleks.com/ppl

University of Northern Iowa

ALEKS PPL Lowers D/F/W Rates by Over 20%

Institution Profile

The University of Northern Iowa, founded in 1876, is home to Iowa's number one teaching program and sits on a 900-acre campus in Cedar Falls, Iowa. Approximately 12,000 students have the opportunity to choose among 90 different majors and over 300 student clubs and organizations in pursuit of a college degree at UNI.

In the five years prior to implementing ALEKS Placement, Preparation and Learning (ALEKS PPL), UNI did not use any placement tool consistently or systematically, and the Drop, Fail, or Withdrawal (D/F/W) rates for Calculus I hovered between 40% and 50%, and about 25% for Precalculus. "Some of us used ACT scores as a placement tool, but it was clear from the results we were getting that this tool was not working for us," said Professor Doug Mupasiri, Math Department Chair. "This D/F/W rate was too high and the mathematics department was very concerned."

Implementation

When ALEKS Placement (the predecessor of ALEKS PPL) was first implemented, there were some compliance problems in the first couple of years. Some students and even academic advisors viewed ALEKS as an unnecessary hurdle for students to overcome. To address these concerns, Professor Mupasiri and the department faculty submitted a curriculum proposal that made ALEKS scores prerequisites for enrolling in a number of mathematics courses. "Once the proposal was approved," claimed Mupasiri, "our problem was solved and their concerns were addressed."

Today, ALEKS PPL is used to place all students who will need to take a mathematics course at the university.

Students have the option of taking the placement exam up to five times, with a time requirement in the Prep and Learning Modules before each retake. Students must spend five hours in the Prep and Learning Modules before taking the placement exam for the second or third time, and three hours before taking the exam the fourth or fifth time.

Although there is no data collected yet on students who spend time in the modules before re-assessing, a quick comparison of the histograms within the ALEKS PPL system, "Initial Placement Assessment Results" and "Most Recent Placement Assessment Results," does show a significant increase in the proportion of students who score 50% or higher on the placement exam. This suggests the modules are making a discernible difference and improving student success.

Results

The biggest change made since using ALEKS PPL has been the structure of the Calculus I course. Instructors no longer need to spend the first couple of weeks reviewing Precalculus material in the Calculus I course. Prior to using ALEKS, the overall D/F/W rate for Calculus I students hovered around 40% to 50%.

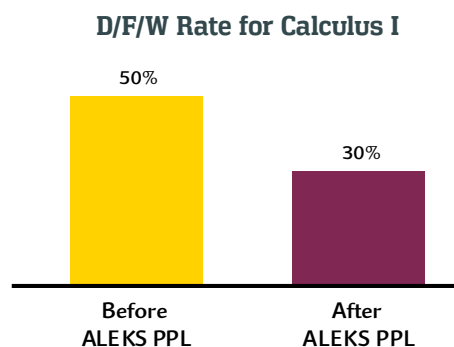


Figure 1

PLACEMENT COURSES: Analysis for Business Students (College Algebra), Introduction to Statistical Methods, Math for the Biological Sciences, Trigonometry, Precalculus, and Calculus I

STUDENTS TAKING PLACEMENT: 2,500

CASE STUDY TERMS: Academic years 2011-2012 and 2012-2013

As a result of implementing ALEKS PPL, the D/F/W rate has decreased to just 30%, which is a 20% reduction (Figure 1).

Professor Mupasiri notes that, in Fall 2012 and Spring 2013, a total of 204 students enrolled in a Calculus I course. Of those 204 students, 123 students had taken the ALEKS Placement exam, while 81 students had not taken the exam.

The D/F/W rate for students who had taken the ALEKS Placement exam was 28.5%. The D/F/W rate for those students who had not taken the ALEKS placement exam was higher at 51.9% – a difference of 23.4% (Figure 2). “It is undeniable that a significant portion of the students who had avoided the ALEKS Placement exam were not ready for Calculus I.” observed Mupasiri.

D/F/W Rate for Fall 2012 - Spring 2013

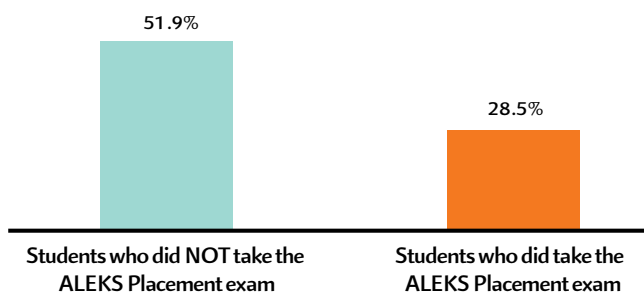


Figure 2

Conclusion

Currently, all incoming freshman and transfer students are required to take the ALEKS PPL Placement exam prior to enrolling in a mathematics course at the university to ensure students are placed into courses where they have the best opportunity to succeed.



“The improvements we have seen in our students’ D/F/W rate are largely attributable to no other factor than our use of ALEKS PPL.”

–Professor Douglas Mupasiri



Oklahoma State University

ALEKS Placement Lowers D/F/W Rates by 15%

Institution Profile

Oklahoma State University, established on Christmas Day in 1890, provides educational opportunities to more than 25,000 students on its OSU-Stillwater and OSU-Tulsa campuses and more than 37,000 students across the OSU system. OSU has a presence in every Oklahoma county through its extension offices and experiment stations and graduates 5,000 students annually.

Oklahoma State University had unsatisfactory student success rates because of the difficulty placing incoming students into courses where they were more likely to succeed. Some students placed into College Algebra were bored because they already knew the material, while other students in the same class struggled to add fractions. This misplacement led to a frustrating classroom environment for both students and faculty and occurred in courses all the way up to Calculus.

Academic advisors were relying on ACT scores for placing students, which were often old and didn't reflect the students' current abilities, or were using high school transcripts, which were inconsistent and difficult to evaluate. Additionally, underprepared students at OSU had few resources available to help them remediate and graduate on schedule. Facing these challenges, the university needed an accurate and effective placement tool and new policies to ensure student success.

Implementation

All students who do not have prior college credit are required to take the ALEKS Placement exam. Those with college credit are strongly encouraged to take the exam as well in order to ensure their level of math is appropriate. Students who score at least 19 on the math portion of their ACT may take their first attempt of the ALEKS Placement exam in an unproctored setting. These students must take the assessment in a proctored environment for any subsequent attempt. Students with an ACT math score of less than 19 must have all attempts proctored. All students are allowed to take the ALEKS Placement exam up to five times within a year.

The ALEKS Prep and Learning Modules are not required, however when Chris Francisco, Associate Professor of Mathematics and Associate Head for Lower-Division Instruction, observed students who took the modules seriously, they nearly always improved their score.

Using the detailed diagnostics available in ALEKS Placement, OSU was able to determine where to spend the most time reviewing in Calculus I. They noticed, for example, that students were far weaker in logarithms and exponential functions than in any other area, and their knowledge in trigonometry was acceptable. Thus they added some review time for logarithms and decreased the amount of trigonometry content covered.

Results

Oklahoma State University is invested in improving their D/F/W rates. They evaluate not only individual course success, but also how students do in subsequent courses in order to measure these rates. After using ALEKS Placement, D/F/W rates have improved overall.

PLACEMENT COURSES: Quantitative Literacy, Mathematical Functions (non-STEM alternative to College Algebra), College Algebra, Precalculus, Trigonometry, Business Calculus, Technical Calculus I, and Calculus I.

STUDENTS TAKING PLACEMENT: 7,000

CASE STUDY TERMS: Summer 2012

Before ALEKS, the 1000-level courses (entry-level courses through Precalculus) had D/F/W rates of 40% or above. Now, the overall D/F/W rate is mostly stable at around 25% (Figure 1).

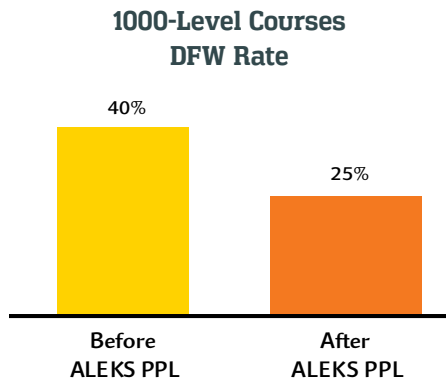


Figure 1

Prior to using ALEKS for placement, many students were taking courses three or more times, which was counterproductive and frustrating for the students and the instructors. After using ALEKS Placement, the D/F/W rate in Calculus I is now around 35% or lower (Figure 2). That is a 10% or greater improvement.

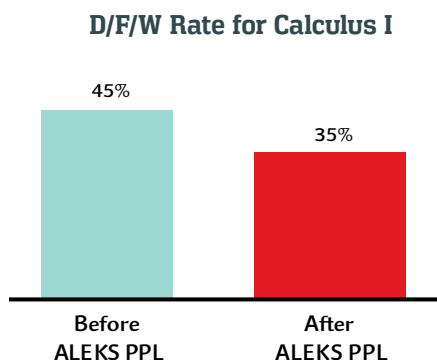


Figure 2

Because students are succeeding at the lower-level courses more efficiently, enrollment and success rates have grown in Calculus II, Calculus III, and Differential Equations even faster than enrollment growth at the university and in the College of Engineering. The enrollment in Differential Equations specifically has skyrocketed, growing nearly 50% in just a few years. Additionally, 92% of students who earned an “A” or a “B” in Calculus I earned an “A,” “B,” or “C” in Calculus II.

Conclusion

OSU is pushing for all students to take the ALEKS Placement, Preparation and Learning (PPL) assessment and work more with the Prep and Learning Modules in the future. And, although none of the module-use data has been collected yet, participation in the modules are being used as a screening tool. Overall, using ALEKS Placement has led to an improvement in student grades and less classroom frustration for both students and instructors.



“We have had a great experience with ALEKS. It has done an excellent job in placing students in courses in which they are likely to succeed, and students who make serious use of the learning modules frequently improve their course placement and/or get much better prepared for the course in which they intend to start.”

–Professor Chris Francisco

William Rainey Harper College

ALEKS PPL Significantly Improves Students' Placement and Performance in College-Level Math Courses

Institution Profile

William Rainey Harper College provides a community college education to more than 26,000 students annually in Chicago's northwest suburbs. Harper College offers associate degrees, certification programs, workforce training, and continuing education classes.

A Study to Evaluate Math Placement

Harper College used ACT's Compass math placement exam for over 20 years. To improve their course placement and success rates for students in college-level math courses, Harper College, in partnership with researchers from Vanderbilt University, conducted a controlled pilot of more than 1,000 students during the summer of 2014 and subsequently monitored student performance in math classes during the fall of 2014.

The pilot design and analysis were done by researchers at Vanderbilt University to allow for an independent, unbiased and data-driven assessment of ALEKS PPL relative to the student body. The ALEKS PPL product was used by students in the experimental study group and compared against a control group of students who utilized the ACT Compass assessment.

Implementation

Harper College requires degree-seeking students who do not have an ACT math score of 22 or higher from within the past five years to demonstrate their mathematical abilities by taking a math placement exam. The placement exam serves to place students from developmental math through Calculus I. The first assessment students take is proctored, and additional assessments are not.

Harper College requires that students use the ALEKS PPL Prep and Learning Module prior to reassessing. Students must spend three hours in the Prep and Learning Module in order to take the second assessment, and an additional three hours is required for a third attempt. A fourth attempt is available for students who spend an additional five hours in the Prep and Learning Module and, finally, eight additional hours are required for a fifth and final attempt.

Results

Students who used ALEKS PPL were 7–9% more likely to place in a college-level math course compared to the control group who used Compass. Additionally, students who used ALEKS PPL were 19% more likely to receive a “C” or better in their college-level course. Those students were also 22.5% more likely to stay enrolled at Harper College for a second semester (Figure 1). Although those who placed into developmental coursework earned similar grades as compared to the Compass control group, this still points to a positive outcome due to ALEKS students placing higher in the developmental course sequence as compared to Compass testers.

PLACEMENT COURSES: Developmental math, which includes Basic Mathematics, Beginning and Intermediate Algebra, and Data Modeling with Algebra, and into Collegiate Math

STUDENTS TAKING PLACEMENT: 3,500 students per academic year

CASE STUDY TERMS: Summer 2014 and Fall 2014



Results show that having to use the ALEKS PPL Prep and Learning Module prior to taking the exam does not deter students from re-taking the placement exam. In fact, students who used the Prep and Learning Module prior to re-taking the placement exam had a higher retest rate of 36% compared to students who used Compass (and were not required to participate in a learning module) who had a 32% retest rate.

Additionally, when students used the Prep and Learning Module prior to re-taking the placement exam, students improved their course placement scores and were more successful in the math course in which they enrolled (success is defined as earning a “C” or better). 82% of students who used the Prep and Learning Module increased their course placement on their reassessment as compared to only 36% of students who reassessed using Compass (Figure 2). Further, the use of the ALEKS PPL Prep and Learning Module increased the probability of a student passing the math course in which they enrolled by 10%.

Percentage of Students that Improved Course Placement After Reassessing

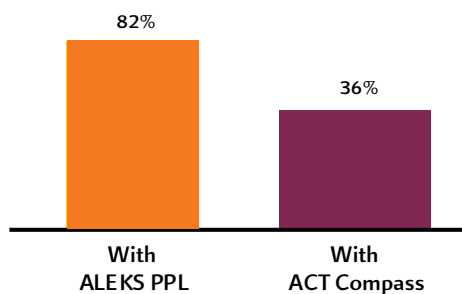


Figure 2

Results for Students Placing into College Level Courses (ACT Compass vs. ALEKS PPL)

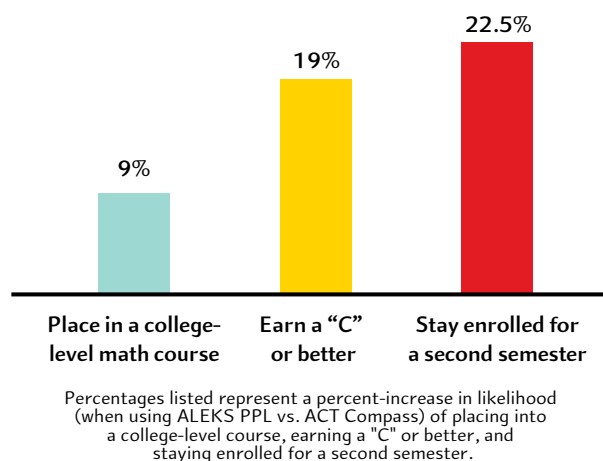


Figure 1

Conclusion

Harper College has adopted ALEKS PPL as the official college math placement program because students who used ALEKS PPL had higher level placements, higher success rates in college-level math courses, and were more likely to stay enrolled at Harper College for a second semester.

“Upon completion, students are provided a full and complete profile of their mathematical abilities broken out by 314 math concepts. ALEKS PPL not only provides a stable testing platform, but it is a placement exam and diagnostic tool all wrapped into a single student experience.”

–Matthew McLaughlin, Director, Title III & Testing Center

Portland State University

ALEKS PPL Improves Student Success

Institution Profile

Portland State University has an annual enrollment of over 23,000 undergraduate students, with over 4,000 students enrolling in ten entry-level mathematics or statistics courses. The university's motto is "Let Knowledge Serve the City", and it does so, with a large population of non-traditional students and returning adults.

Portland State University set out to increase success rates in ten mathematics and statistics courses ranging from Elementary Algebra to Calculus. A common cause of failure was student deficiencies in prerequisite knowledge; likely due to the lack of placement testing and prerequisite enforcement at Portland State. A Placement Committee decided that ALEKS Placement was the best placement tool available, due to its accuracy, flexibility, and built-in remediation tool. In 2012, the first year of implementation, Portland State saw a 6% increase in pass rates for students who used ALEKS Placement when compared to 2011. For students who did not use ALEKS Placement, but instead satisfied the prerequisite through a previous course, Portland State saw a 2% decrease in pass rates; indicating that ALEKS better assesses and prepares students for mathematical success.

Implementation

Prior to using ALEKS Placement, Portland State University had no method for placing students into their mathematics and statistics courses. Additionally, there were recommended prerequisites, but none were enforced. Once ALEKS Placement was implemented for placement in 2012, the policy enforced by the Department of Mathematics and Statistics was that students must either place at the necessary level on the placement test in ALEKS or have successful completion ("C" or above) of the prerequisite course or higher. The placement program at Portland State is designed so that students can take the assessment at any time and location most convenient to them. If the desired score is not initially reached, students can utilize a 6-month, self-paced remediation tool within the ALEKS Prep and Learning module, and retake the assessment. This process makes placement much more convenient for students and less nerve-racking for those with math and/or test anxiety. The ALEKS Prep and Learning Module also takes the guess-work out of reviewing; it tells the student exactly which topics they know, don't know, and more importantly, which topics they're ready to learn next. This can save a student several hours of either reviewing topics that are already mastered (boredom) or reviewing topics that are too difficult for their current knowledge state (frustration).

Results

In 2012, Portland State had 3,371 students complete the ALEKS Placement exam. A total of 891 students re-took the assessment in an effort to improve their placement score. Of those students, 86% (767) improved their score enough to move up at least one course. Additionally, of the 3,371 students who completed the placement test, over 50% (1,699) were

Number of Courses Jumped	Number of Students	Percent of Students
1	325	37%
2	215	24%
3	182	20%
4	45	5%

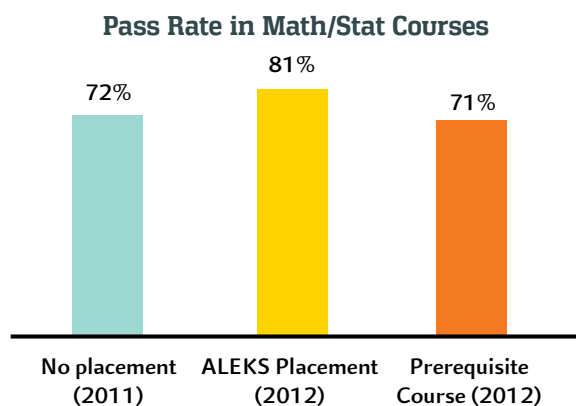
PLACEMENT COURSES: ALEKS Prep for Calculus course placement into Elementary Algebra through Calculus

STUDENTS TAKING PLACEMENT: 3,700

CASE STUDY TERM: 2012 calendar year

initially placed into a remedial course (either Elementary or Intermediate Algebra). For those remedial students who chose to reassess (806 students), 64% of them (519) were able to place out of a remedial course and into a college-level course. This leads the way to increased retention, reduced time to graduation, and more major/degree options.

Within the first year, Portland State saw an interesting change in the pass rates. Although the pass rates only increased by 1.6% overall compared to 2011, there was a significant difference in course performance between students who got into the class by placing via ALEKS Placement, as opposed to passing the prerequisite course. Students who placed with ALEKS Placement had a 10.5% higher pass rate than those who had passed the prerequisite course. This shows that ALEKS Placement better assesses and prepares students for mathematical success. Additionally, after ALEKS Placement was implemented, instructors reported anecdotally that students seemed better prepared, creating an improved classroom dynamic for more effective and consistent instruction.



Conclusion

The Placement Committee has been very happy with the results that ALEKS Placement has produced and have begun using ALEKS Placement, Preparation, and Learning (PPL). Both students and instructors have seen first-hand the benefits of math preparation and remediation with ALEKS. Students are still able to enroll in their preferred course, but only after ensuring that they are adequately prepared and likely to succeed. This allows instructors to teach the course as intended, and even present more challenging and motivational problems to students.



"ALEKS not only gives students the opportunity to place into their preferred course through remediation, but also helps students succeed in that course."

– Austina Fong, Math Placement Coordinator



University of Kentucky

ALEKS PPL Provides Developmental Support, Places Students More Accurately, and Improves Student Success

Institution Profile

The University of Kentucky, located in Lexington, Kentucky, was founded in 1865. In the fall of 2014, just over 30,000 students enrolled and pursued undergraduate and graduate degrees in 16 colleges on an urban campus that covers 784 acres.

A Change for Math Placement

Before ALEKS PPL, incoming students at the University were placed using a variety of measures, resulting in a lack of consistency across the board. Students were retesting immediately after taking their first placement attempt and not improving their chance to place into a higher-level course. Overall, the process led to lower morale for students and an increase in cost to the University because it was paying for each test attempt.

In recent years, the University had tried a number of different placement models, all of which seemed too expensive for how inaccurate and inconvenient they were for students.

Between 2007-2009, the University of Kentucky used an in-house, paper-and-pencil math placement test for thousands of incoming students each year. The results suggested highly inaccurate placement because the D/F/W rates ranged from about 35% to as high as 50% in some 100-level math courses (Collegiate-level courses up to Calculus I).

In response to a state-wide policy initiative in 2009, the University outsourced the developmental math support to a local community college. As a result, math faculty and student support professionals at the University had no oversight of the curriculum, assessment, and relative level of preparation that was being provided to students in developmental math. Unfortunately, there was no substantive improvement in student success rates when students enrolled in the 100-level math courses at the University of Kentucky, and the outsourcing cost was approximately \$300,000 its first year.

The University of Kentucky also tried different placement programs, such as placing students based on their ACT or SAT sub-score, but none of these models made a measurable difference in helping students succeed.

After trying multiple placement models, the University of Kentucky implemented ALEKS PPL in January 2015 and overall the experience has been a positive one. The transition to ALEKS PPL was facilitated by bringing together a group that represented mathematics faculty, administrators, testing professionals, academic advising professionals, and IT staff. The composition of this group allowed for inclusive decision-making processes and it provided opportunities to educate all stakeholders on the importance of cohort-wide math placement testing.

Implementation

ALEKS PPL is used to place all incoming first year students who have an ACT sub-score of 30 in mathematics (680 SAT) or below. This decision is in part based on the Kentucky Council for Postsecondary Education, who has set

PLACEMENT COURSES: Students place into eight courses from Developmental Math to Calculus I.

STUDENTS TAKING PLACEMENT: 4,500

CASE STUDY TERMS: January 2015



specific college readiness standards for the state of Kentucky. Students who have a sub-score of 30 or above may enroll in any math class up to Calculus I.

Students who test into developmental math courses are placed into courses that were designed by the math department and Academic Enhancement, the department on campus that provides centralized academic support services. They review the ALEKS PPL diagnostic data regularly to inform how the developmental math courses should be structured, and to determine what topics are most relevant in ensuring that students are placed into 100-level math courses accurately.

Placement exams are taken at home and un-proctored. When allowed to take the ALEKS PPL placement exam online on their own schedules, 95% of students complete the exam by the deadline. This timeliness allows academic advisors the opportunity to review the results and be ready to help students register for the appropriate classes.

With ALEKS PPL, students are required to spend a minimum of three hours working in the Learning Modules before students can attempt the test a second time.

Results

When ALEKS PPL is used to place students in developmental courses, fewer students need developmental support. “This is directly attributable to the online Learning Modules that are integrated into ALEKS PPL”, says Ali Cicerchi, Assistant Director of Academic Enhancement. Prior to implementing ALEKS PPL, 20% of students needed developmental courses when enrolling in the University of Kentucky.

After implementing ALEKS PPL, only 11% of students need developmental math support when enrolling at the university (Figure 1). This decrease is especially significant because the size of the cohort increased from about 3,900 to 5,000 students.

Additionally, students who enroll in the developmental math courses enjoy a significant decrease in time-to-readiness. When students enrolled in the community college courses, they were often spending a year or more working toward math readiness.

After implementing ALEKS PPL, the University of Kentucky has seen as many as 84% of students enrolled in ALEKS-based developmental math courses demonstrate math readiness in just one semester. Moreover, when these students enroll in a 100-level math course, 86.5% complete that course successfully. The first-to-second fall retention rate for students who matriculate needing developmental math support has increased to 77%, showing that math success has broader impacts for students.

Further, students save money. Previously, students were paying testing fees to private centers that charged as much as \$70 per test. Because of the anticipated cost savings to the University of Kentucky, it currently underwrites the cost of ALEKS PPL, and students are not charged for the test.

Percentage of Students Who Need Developmental Math Courses

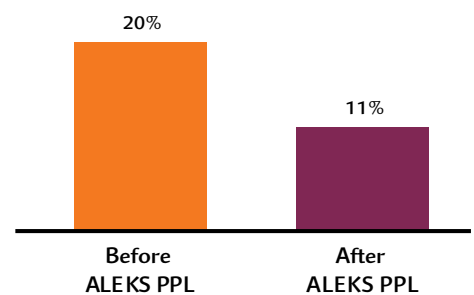


Figure 1

“Implementing ALEKS PPL has saved admitted students real dollars.”

–Dr. Jim Breslin, Director of Academic Enhancement

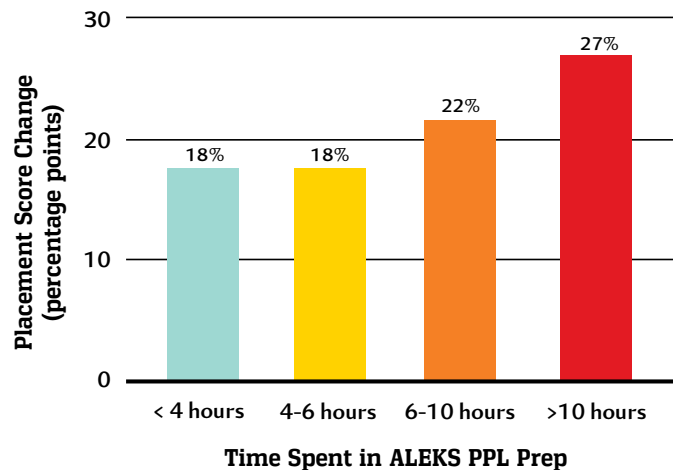


University of Kentucky (cont.)

In a pilot implementation of ALEKS, the university saw more accurate placement, resulting in decreased need for students to retake courses. Additionally, implementing ALEKS in developmental math coursework alone saved the university more than \$150,000 compared to the previous model of outsourcing to a community college. This cost savings alone was sufficient to fund the initial year of nearly universal ALEKS PPL for incoming students.

At University of Kentucky, ALEKS PPL is configured to require students to work in the Prep and Learning Modules a minimum of three hours before taking the placement exam again. During the spring 2015 term, 367 students accessed a second attempt. Of those, 226 spent more than the required three hours in the Prep and Learning Modules. Data shows, on average, for any student who spends at least three hours in Prep and Learning mode, and then takes a second assessment, their placement score increases by 18.46 percentage points. Jim Breslin says, “We see significant correlations between time spent in the Prep and Learning Modules and score increases on a second test attempt.”

Impact of Time in ALEKS PPL Prep and Learning Modules on Placement Scores



Conclusion

ALEKS PPL has made a significant impact on the University of Kentucky's ability to place students in appropriate math courses. Additionally, students who are placed in developmental math courses are able to efficiently remediate to math readiness, pass the course, and stay enrolled at the University of Kentucky.

More appropriate math course placement early in students' college careers helps them succeed academically and save money by reducing testing fees and the amount of time the students spend in math readiness courses. Jim Breslin states, “Research is clear that math success is connected to overall student success.”





Student Testimonials

on the Success of ALEKS PPL

"This software was outstanding – so intuitive and easy to use. I loved having the flexibility to work on campus or at home. I also found that using ALEKS inspired me to be self-motivated in my math learning. It was a fun challenge to work through the pie slices and see my progress. I learned so much!"

"The self-directed nature of using the ALEKS software inspired me to work harder – I learned so much math over 4 weeks! I had not realized how much I had forgotten, and ALEKS has helped me discover this."

"When you take the placement assessment for the second and third time, it definitely shows you that your effort is worth it, because I was so shocked, honestly, to have improved that much in such a short amount of time."

"I feel I was placed very well. If I don't remember how to do this, I need to relearn it."

ALEKS Placement Lowers D/F/W Rates By Properly Placing Students in Courses That More Accurately Reflect Their Skill Levels

Institution Profile

The University of Illinois, founded in 1867, educates over 32,000 students from all 50 states and over 5,000 international students. The university is in the twin cities of Champaign and Urbana in east-central Illinois, where students choose among 16 colleges and instructional units. In its 2016 rankings, *U.S. News & World Report's America's Best Colleges* rated the University of Illinois 11th among public universities and 42nd among national universities.

Prior to using ALEKS, students were placed in mathematics courses at the University of Illinois based on ACT scores. Unfortunately, some students were improperly placed, which led to “high failure and withdrawal rates in many of the introductory mathematics courses.”¹

University of Illinois wanted to find a way to reduce the students’ failure and withdrawal rates. Having had experience with ALEKS in the classroom, Alison Ahlgren-Reddy, Instructor and Placement Coordinator in partnership with Marc Harper, former Teaching and Research Assistant, approached ALEKS Corporation about adapting the Prep for Calculus product into a placement exam tool. ALEKS was chosen because “of its ability to measure students’ knowledge and the fact that it is cross-platform (requiring only a web browser), non-multiple choice, and adaptive.”² Through working with ALEKS Corporation, they were able to create a placement exam which they began to use and study to evaluate impacts on student success.

Research Details

In Fall 2007, Spring 2008, and Fall 2008, data was collected from approximately 10,000 students. The total number of assessments was 15,000 exams because approximately 20% of the students took more than one assessment.³ This data came from students who were enrolled in four types of courses.⁴ Comparison data is not possible for Preparation for Calculus (Math 115 PreCalculus) because the course was first offered in Spring 2007; therefore, Fall 2006 data is not available.⁵

Implementation

ALEKS was implemented in the summer of 2007 as a tool to assess students for course readiness in four focus courses: Preparation for Calculus (Math 115); Calculus I (Math 220); Calculus I for Students with Experience (Math 221); and Business Calculus (Math 234).

The first year ALEKS was implemented, the cutoff score for Precalculus and Business Calculus was 40%; for Calculus I and Calculus I for Students with Experience, the cutoff score was 60%. Initially, participation in ALEKS was encouraged by making the exam 10% of the students’ final grades. The other 90% of the grade was determined by homework, quizzes, and exams. However, by the next year, the cutoff scores rose 10% each (50% for Precalculus and Business Calculus; 70% for Calculus I and Calculus I for Students with Experience). Further, the ALEKS placement exam was required and was a prerequisite for course placement by the university.⁶

PLACEMENT COURSES: Preparation for Calculus (Math 115); Calculus I (Math 220); Calculus I for Students with Experience (Math 221); and Business Calculus (Math 234)

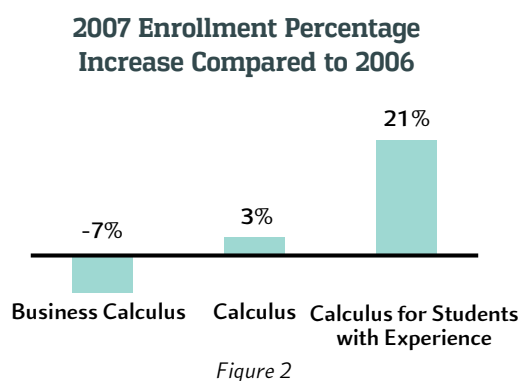
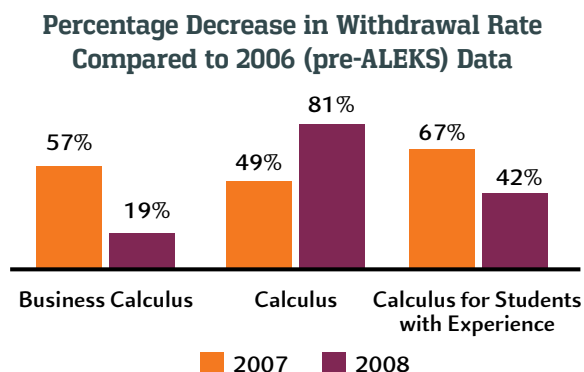
STUDENTS TAKING PLACEMENT: 8,500

TIMEFRAME OF RESEARCH: 2006, 2007, and 2008

Ahlgren-Reddy and Marc Harper write, “The policy change emphasized the positive role of assessment for the students, by providing an accurate and current assessment of their skills to them and to the mathematics department. For many students, ALEKS assessment may have been the first objective evaluation of their mathematical skills that they had received in years (or ever).”⁷

Results

Results show that ALEKS impacted the D/F/W rate positively by reducing the number of students who failed and/or withdrew from focus courses. Ahlgren-Reddy and Harper write, “In all four placement courses, the number of D/F/W students averaged in 2007 and 2008 was lower than in 2006.”⁸ Additionally, because fewer students were failing and/or withdrawing, more students were enrolling in more advanced math courses. Withdrawals were reduced in Business Calculus and Calculus I for Students with Experience by 38% and 25%, respectively (Figure 1),⁹ as enrollments shifted to more advanced courses (Figure 2).¹⁰ In short, with ALEKS, more students were learning more advanced math more efficiently.



FULL RESEARCH PUBLICATIONS:

Marc Harper, Alison Ahlgren Reddy. *Mathematics Placement at the University of Illinois*. PRIMUS, August 2013

Marc Harper, Alison Ahlgren Reddy. *ALEKS-based placement at the University of Illinois*. Contributed Chapter, Knowledge Spaces: Applications in Education. Springer. Aug 2013

Marc Harper, Alison Ahlgren Reddy. *Assessment and Placement through Calculus I at the University of Illinois*. Notices of the AMS, Nov 2011

University of Illinois (cont.)

Significantly, fewer students take Business Calculus, a calculus course with less rigor that may not be accepted as fulfilling the undergraduate calculus requirement in business graduate programs and, instead, complete courses like Calculus I and Calculus I for Students with Experience, which are more rigorous and do help fulfill enrollment requirements.

When compared to the 2006 data, fewer students failed (D+, D, D --, and F) Business Calculus (Figure 3).¹¹ Although more students failed Calculus I and Calculus I for Students with Experience, note that more students are enrolling in those more advanced courses (Figure 4).¹²

Further, data collected from ALEKS can be used to assess and strengthen curricula and to provide specific feedback on pedagogy. Advisors use the ALEKS tool to place students into courses instead of helping students out of courses.¹³

Ahlgren-Reddy and Harper write, “Enforced math placement has had a positive effect campus-wide, as other units are now reporting improvements in their core courses that heavily rely on Precalculus and Calculus I prerequisites.”¹⁴

Conclusion

By improving student placement in focus courses, ALEKS showed significant impact in reducing the percentages of students who failed or withdrew from courses. After implementing ALEKS, the number of D/F/W students lowered, enrollment rates improved for advance courses and ALEKS was able to provide data to strengthen the curricula and student success.



Percentage Decrease in D/F Rate Compared to 2006 (pre-ALEKS) Data

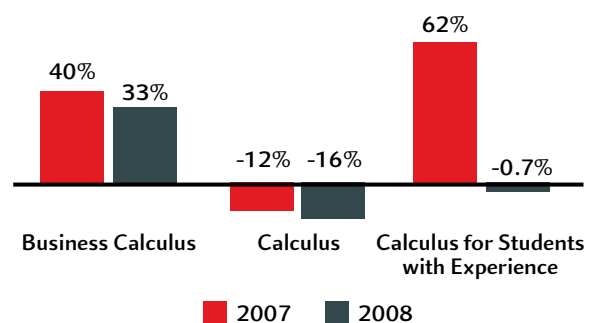


Figure 3

2008 Enrollment Percentage Increase Compared to 2006

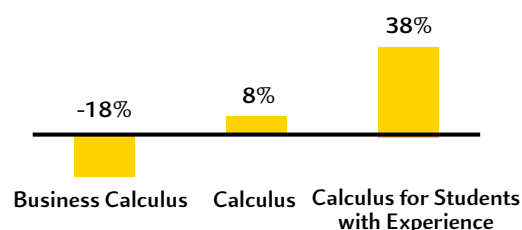


Figure 4

¹ Marc Harper and Alison Ahlgren-Reddy. “ALEKS-based Placement at the University of Illinois,” in *Knowledge Spaces: Applications in Education*, eds. Jean-Claude Falmagne, Deitrich Albert, Christopher Doble, David Eppstein, and Xiangen Hu (Berlin: Springer-Verlag Berlin Heidelberg, 2013), 52.

² Ibid, 52.

³ Ibid 54.

⁴ Ibid., 56.

⁵ Ibid., 57.

⁶ Ibid., 53-54.

⁷ Ibid., 53.

⁸ Ibid, 53.

⁹ Ibid., 57.

¹⁰ Ibid, 57.

¹¹ Ibid., 57.

¹² Ibid, 57.

¹³ Ibid., 68.

¹⁴ Ibid, 68.

Select Colleges & Universities Placing with ALEKS

Ball State University

Brigham Young University – Idaho

California State University, Long Beach

Cedar Valley College

City Colleges of Chicago

Clemson University

Des Moines Area Community College System

Eastern Washington University

Florida A&M University

Florida Atlantic University

Florida International University

Florida State University

Howard University

Indiana University

Iowa State University

Kent State University

Lewis & Clark College

Loyola University, Chicago

Louisiana State University

Marquette University

Michigan Tech University

Northern Arizona University

Northwestern University

Oklahoma State University

Oklahoma State University – Tulsa

Oregon State University

Penn State University

Portland State University

Purdue University

San Diego State University

Shawnee State University

Spokane Community College

State University of New York - Oswego

University of Alaska - Fairbanks

University of Arizona

University of California – Irvine

University of California – Santa Cruz

University of Colorado – Boulder

University of Connecticut

University of Delaware

University of Florida

University of Illinois - Urbana Champaign

University of Illinois at Chicago

University of Indianapolis

University of Iowa

University of Kentucky

University of Massachusetts – Boston

University of Memphis

University of Miami

University of Missouri

University of Montana – Missoula

University of Northern Colorado

University of Northern Iowa

University of Pittsburgh

University of Texas – Austin

University of Texas – Dallas

University of Toledo

University of Tulsa

Washington State University

William Raney Harper College





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