



Features and Benefits

Research-Based Technology

ALEKS assessment and learning technologies were originally developed by a team of cognitive scientists, mathematicians and software engineers at the University of California, Irvine, with major funding from the National Science Foundation. ALEKS is founded on over twenty years of extensive scientific research in a ground-breaking field of cognitive psychology and applied mathematics known as Knowledge Space Theory. Through adaptive questioning, ALEKS accurately assess a student's knowledge state, and then delivers targeted instruction on the topics a student is most ready to learn.

Knowledge Space Theory provides a theoretical foundation for efficient knowledge assessment in various domains of knowledge ranging from mathematics and the sciences to appropriate topics in business and the social sciences. It is not intended for what are commonly referred to as 'tests' and does not typically produce numerical measures of ability. Rather, Knowledge Space Theory supports the construction of efficient computer assessment procedures permitting a precise delineation of the knowledge state of individuals.

ALEKS stands for 'Assessment and LEarning in Knowledge Spaces.' The research behind ALEKS is briefly discussed in non-technical terms in the "The Assessment of Knowledge in Theory and in Practice" http://www.k12.aleks.com/about/Science_Behind_ALEKS.pdf.

For more information or a list of key scientific research publications, please contact ALEKS Corporation.

School-to-Home Connection

As ALEKS is web-based, it can be accessed from any computer with a web browser, whether from school, home, or a library. The ALEKS technical requirements are minimal. Whether the student logs off or in the event of an unintended conclusion of a session (e.g. loss of internet connection or computer system crash), the system will always take the student back to the same place she was working at the time the session ended.

Curriculum-Based Assessment

Instruction in ALEKS is based on a program of recurring assessments of individual student knowledge in relation to the comprehensive set of curriculum goals.

ALEKS never uses multiple-choice but requires free response via a set of clever web-based tools. An initial assessment begins after the student learns to use the tools. In a short period of time, ALEKS assesses the student's current knowledge of the subject by asking a relatively small number of questions. ALEKS chooses each question on the basis of the student's answers to all the previous questions. Each student, and therefore each set of assessment questions, is unique.

Assessment results are used to guide students to new material according to their preparedness ensuring that students build on a solid foundation. Instructors and administrators have access at any time to the complete history of students' assessment results and learning progress in ALEKS.

The assessment provides an efficient guide to learning. The ALEKS assessment module differs in principle from any standardized test whose results merely represent the student's achievement as one or more numerical values—an ALEKS assessment determines exactly what a student knows, doesn't know, and is ready to learn.

Some key features of the assessment module are:

1. All problems require that the student produce authentic mathematical input (that is, there are no multiple-choice questions).
2. Assessment questions are generated from items ensuring comprehensive coverage of the domain.
3. The assessment is adaptive: the choice of each new question is based on the aggregate of responses to all previous questions. As a result, the student's knowledge state can be found by asking only a relatively small subset of the possible questions in the domain (typically 20-30).

4. Assessment results are always framed relative to specified educational standards.
5. The entire student system and all of the K-8 content is available in English and Spanish in assessment or learning mode; students can toggle easily between English and Spanish at any time.

Automatic Assessment Reports

Following the assessment, ALEKS delivers a pie-chart report that provides a detailed, graphic representation of the student's knowledge state. The pie chart is divided into slices, each of which corresponds to an area of the curriculum for the student's grade level. In the ALEKS system, the student's progress is shown by the proportion of the slice that is filled in by solid color.

As the mouse is held over a given slice, a list is displayed of items within that area that the student is currently ready to learn, as determined by the assessment. Clicking on any of these items gives the student access to the learning mode.

Individualized Instruction

The ALEKS Learning Mode is an interactive environment in which the student is able to choose from a list of mathematical topics for which she has demonstrated readiness. The student is able to work on practice problems, to demonstrate mastery of new skills, and to move ahead toward fulfillment of curricular and state-standard goals.

The focus of the Learning Mode is a sequence of problems representing a series of concepts to be mastered. The facilities offered by the Learning Mode include:

- Ability to Toggle between English and Spanish at any time;
- Practice problems;
- Explanations of items/problems;
- Worksheets individualized for each student's knowledge state;
- ALEKS Calculator (as appropriate).
- Feedback;
- Progress monitoring;
- Practice;
- Review of any problem previously mastered.

ALEKS will at times offer advice in response to a student's answer. For example, if a student has answered a question in practice without adding the appropriate

units, ALEKS may suggest that the student check her units. ALEKS may also propose that the student temporarily abandon the problem at hand and work instead on another problem.

When a student has demonstrated mastery of a particular item by repeatedly solving problems based on it, ALEKS will add that item to the student's "pie," adjust the student's knowledge state (to make additional topics available where appropriate), and encourage the student to proceed to a new item.

Step-by-Step Explanations

A student working on a particular problem may "ask for" an explanation of that problem (by clicking on "Explain"). The explanation typically provides a short solution of the problem, with commentary. The explanation will include a step-by-step solution of the *exact* problem with the same values as the problem that was presented (that is, the explanation adjusts to match the algorithmically generated problem). In many cases, an alternative or more detailed explanation is also available.

After reading the explanation(s), the student may return to "Practice" (by clicking on "Practice"), where she or he will be presented with another problem based on the item or problem type just illustrated. If the student is successful in solving the problem, the system will offer a few more instances of the same item to make sure the student has mastered it.

State Standards Alignment

ALEKS offers a wide range of course products with complete coverage of school mathematics, and can be aligned with many state standards for math instruction. Teachers and administrators can easily access a State Standards Report and monitor any given student's progress towards mastery of state standards, including exactly which items (problem-types) a student has or has not currently mastered.

Comprehensive Teacher's Mode

The teacher mode enables educators easily and conveniently to monitor student progress and achievement; to view and change the conditions applied in the generation of assessment reports; and to carry out other administrative tasks. There are two levels of users in the teacher module: teacher and administrator.

A teacher can, among other things, perform the following operations for his or her classes:

- View and print a report of an individual student's progress toward the state mathematics standards;
- View and print a summary of information for each student including assessment results, progress in the learning mode, and total time in ALEKS;
- View and print synthetic reports for entire classes, giving an overview of the class's strengths and weaknesses;
- Edit student registration data or retrieve forgotten passwords;
- Message with students in ALEKS using the ALEKS math input tools.

An administrator can perform the following operations:

- Do everything a teacher can do;
- View, print, and edit the list of teachers and classes;
- View and edit the default content standards for any given class;
- Move students between classes and classes between teachers and perform other, similar administrative tasks;