Early Experiences with EdReady—A Tool for Improving Math College Readiness

November 2015

SRI Education™
A DIVISION OF SRI INTERNATIONAL

Authors

Marianne Bakia, SRI International
Rebecca Griffiths, SRI International
Claire Christensen, SRI International
Vanessa Peters, SRI International
Shari Gardner, SRI International

Developed by SRI Education with funding from the Bill & Melinda Gates Foundation.

This report is based on research funded by the Bill & Melinda Gates Foundation. The findings and conclusions contained within are those of the authors and do not necessarily reflect positions or policies of the Bill & Melinda Gates Foundation.

Acknowledgments

The authors would like to thank Davilla Grose, Bruce Johnson, Glenn Kleiman, Sam McCool, and Ryan Schenk for their assistance in coordinating site visits and providing helpful information for writing this report. We would also like to express our thanks to the many other individuals who shared their time and experiences and perspectives using EdReady at their schools and campuses. We are also grateful to Gary Lopez, Ahrash Bissell and others at EdReady for supporting this evaluation study.

Suggested Citation

Bakia, M., Griffiths, R. Christensen, C., Peters, V. L., & Gardner, S. (2015). *Early Experiences with EdReady—A Tool for Improving Math College Readiness.* Menlo Park, CA: SRI Education.

Contents

Executive Summary	4
I. Bridging the Math Skills Gap	6
II. A Closer Look at How EdReady Is Used	9
III. Exploring Opportunities for Statewide Adoption	18
IV. Lessons Learned About Strong Institutional Implementations	27
V. Conclusions	30
Appendix	31

Executive Summary

Far too many students arrive at college underprepared to succeed in college-level math. Traditionally, students who cannot demonstrate the necessary math skills based on commonly used tests are placed in full semester "developmental" math courses designed to help students "catch up." Instead of preparing students to continue their postsecondary education, however, these courses often seem to drain students' resources, motivation, and opportunity. The overall impact is that an alarmingly high percentage of students who place into developmental courses fail to attain degrees.

The educational community is increasingly aware that current approaches to developmental math need to be improved to ensure that more students are able to complete their postsecondary education. A great deal of experimentation and innovation is taking place to make sure students are "college ready" when they graduate from high school and to help underprepared students accelerate progress into college-level math. Emerging technologies play a key role in many of these efforts, as they can provide instructors with tools to identify and address skill gaps for individual students.

In 2014, the non-profit NROC Project launched EdReady, an online instructional system that uses diagnostic assessments to determine students' math readiness and to tailor instruction to address gaps in an individual student's knowledge. EdReady is available free to individual students and at very low cost—around $1 per student—to schools and postsecondary institutions. The tool was designed to be highly customizable, and it has been used in a variety of ways, from independent use by students to test prep "boot camps" to blended approaches in campus-based math courses. EdReady can be used by a wide age range of students—including those in middle school, high school, and 2- and 4-year colleges. Early pilot studies of EdReady have produced promising results.

The EdReady system has attracted interest and enthusiasm from educators, administrators, and policymakers because of its low cost, streamlined design, flexibility, and mission-driven governance model. In the fall of 2015, EdReady reported just over 32,000 cumulative users across 47 states as of August 2015, representing adoption in 147 institutions, of which just over half are postsecondary. The system is being used in a variety of ways, including test preparation, co-curricular use, and as a supplement to classroom instruction.

SRI Education (SRI) was retained by the Bill & Melinda Gates Foundation to evaluate EdReady over the course of three years, from 2014 through 2017. The evaluation has two overarching purposes: 1) to provide formative feedback about the implementation, design, and functionality of EdReady, and 2) to collect and produce evidence about the association between EdReady and the preparation of underprepared learners to meet postsecondary mathematics requirements. This first report summarizes emerging lessons learned about streamlining adoption and implementation, with particular focus on prevalent uses of EdReady and on statewide adoptions. The report identifies six instructional use cases and examines four statewide adoptions in progress: Hawaii, Montana, Nevada,

and North Carolina. Through interviews, site visits, observations of EdReady use and review of extant documents such as pilot reports, SRI identified five indicators of potential readiness for adopting EdReady at scale and five lessons learned about strong implementations.

Key Findings

Statewide policies and priorities help predict where enrollments in EdReady are likely to be higher than average. SRI identified a set of five "readiness indicators" that together may help explain why EdReady has taken off more quickly in some areas. The indicators are:

- K20 reforms that focus on preparedness and mastery,
- policy focus on open educational resources,
- efforts to streamline developmental education,
- states that do not allow 4-year institutions to offer or require developmental education, and
- states with high school exit exams.

Local conditions and practices also appear to play a strong role in the effective use of EdReady. The five lessons learned in the course of the study for a strong implementation of EdReady include the importance of:

- empowering local champions,
- generating buy-in among multiple stakeholders,
- finding potential users seeking flexibility,
- providing professional development and technical assistance, and
- ensuring adequate and equitable student access to technology.

EdReady has been most successful in states that have local support units in place to build awareness of EdReady, show educators how the system can address their needs, and facilitate implementation.

Next Steps

SRI will continue to study impact with attention to associations between student use of EdReady and students' learning of mathematics. Impact studies are planned for the 2015-2016 school year to estimate the type and magnitude of effect associated with EdReady use as compared to alternatives that do not use EdReady.

I. Bridging the Math Skills Gap

A very large proportion of students seeking to pursue postsecondary education are not meeting common measures of college readiness in math and literacy. About 60% of students entering community college and 30% of those entering 4-year institutions do not demonstrate the basic math and writing skills needed for college-level coursework.[1] These students are often placed into what are often called "developmental" math courses designed to help students "catch up" so that they can continue their postsecondary education.

The educational community is increasingly aware that current approaches to developmental math need to be improved to ensure that more students are able to complete their postsecondary education. Students do not receive credit for developmental courses but must pass them in order to enroll in credit-bearing courses and satisfy degree requirements. Yet, less than one-third of students who take a remedial course attain a college degree within 8.5 years. Moreover, recent research shows that commonly used placement tests are weak predictors of a student's college grades and that up to a third of students who place into developmental courses could have succeeded in college-level ones.[2] A major weakness of these tests is that they are blunt measures of students' overall strengths and weaknesses, and the standard remedy for subpar scores—entire semesters of developmental courses—is poorly calibrated to individual students' needs. Despite these limitations, students must pay fees out-of-pocket (or using up financial aid) for associated tests and developmental courses.

It seems business-as-usual approaches to academic remediation have become a barrier rather than a pathway to degree attainment: developmental courses appear to drain students' resources, motivation, and opportunity. The scale of this problem has spurred a variety of responses among educators and policymakers. For example,

- Secondary schools are creating interventions for students who have fallen behind and are providing explicit preparation for college placement tests.
- A growing number of institutions are offering summer bridge programs to smooth the transition from high school to college, enabling students to raise their placement test scores and strengthen their academic and study skills.
- Postsecondary institutions are streamlining developmental sequences and offering co-curricular supports for college-level courses.

[1] Attewell, P., Lavin, D., Domina, T., & Levey, T. (2006). New evidence on college remediation. (National Educational Longitudinal Study - NELS: 88.) ***Journal of Higher Education***, 886-924.

[2] Belfield, C., & Crosta, P. M. (2012, February). *Predicting success in college: The importance of placement tests and high school transcripts.* New York, NY: Community College Research Center. http://ccrc.tc.columbia.edu/publications/predicting-success-placement-tests-transcripts.html Retrieved November 18, 2015.

Policymakers in several states are also seeking legislative solutions, such as mandating better coordination between high schools and colleges or simply barring 4-year institutions from offering developmental courses. In fact, an estimated 10 states no longer allow 4-year institutions to offer or require developmental education courses.[3] However, early results from at least one such policy experiment (in Florida) are mixed and suggest that the need to support underprepared college students cannot simply be legislated away.[4, 5]

Emerging Innovations

Administrators and educators in postsecondary institutions are trying out innovative approaches to support students who need remediation, particularly in mathematics. Many are looking to online and blended instructional solutions in the hope that personalized learning software can address specific skill gaps as an alternative to marching all students through lockstep developmental courses. For example, the National Center for Academic Transformation helped pioneer the "emporium" model in which students work independently in computer labs with roving facilitators who assist students as needed.[6] Models like this one often use mastery-based, commercial products such as MyFoundationsLab from Pearson and ALEKS from McGraw Hill to supplement or replace a portion of class time, with other alternatives emerging. However, attempts to develop new approaches to remediation involve some trial and error. For example, one high-profile experiment with a "massively open" online developmental math course was called off because of disappointing results from pilot studies, hinting at the limits of what technology alone can do for students who are behind academically.[7]

An Overview of EdReady Math

In 2014, the NROC Project, with support from the Bill & Melinda Gates Foundation, launched EdReady Math with the aim of helping students avoid the time and cost of remedial education. EdReady is an online instructional system that uses diagnostic assessments to determine students' math readiness and to tailor instruction to address gaps in an individual student's knowledge. The tool was designed to be highly customizable, and it has been used in a variety of contexts, from independent use by students online to blended approaches in campus-based math courses. EdReady includes mathematics content appropriate for a wide age range of students—including those in middle school, high school, and 2- and 4-year colleges.

[3] Smith, A. A. (2015, May 8). *Legislative fixes for remediation. Inside Higher Ed.* https://www.insidehighered.com/news/2015/05/08/states-and-colleges-increasingly-seek-alter-remedial-classes Retrieved November 18, 2015.

[4] Smith, A. A. (2015, June 25). When you're not ready. *Inside Higher Ed*. https://www.insidehighered.com/news/2015/06/25/floridas-remedial-law-leads-decreasing-pass-rates-math-and-english Retrieved November 18, 2015.

[5] Mangan, K. (2015, July 28). Remedial educators warn of misconceptions fueling a reform movement. *The Chronicle of Higher Education.* http://chronicle.com/article/Remedial-Educators-Warn-of/231937/?cid=cc&utm_source=cc&utm_medium=en Retrieved November 18, 2015.

[6] National Center for Academic Transformation (n.d.). *How to structure a math emporium*. http://www.thencat.org/R2R/AcadPrac/CM/MathEmpFAQ.htm Retrieved November 18, 2015.

[7] Research & Planning Group for California Community Colleges. (September 2013). *SJSU Plus Augmented Online Learning Environment: Pilot Project Report.* Sacramento, CA. http://www.sjsu.edu/chemistry/People/Faculty/Collins_Research_Page/AOLE%20Report%20Final%20Version_Jan%201_2014.pdf Retrieved November 18, 2015.

EdReady Development Timeline

Content (Including Quality of Reasoning and After 6 years of research and development guided by educators, the NROC Project created EdReady. The NROC Project is a national nonprofit supported by its member institutions and by the Bill & Melinda Gates Foundation and The William and Flora Hewlett Foundation. EdReady draws on multimedia instructional material developed by NROC. Other content repositories are also available in EdReady, including Art of Problem Solving, Khan Academy, Phoenix College Collection, STEMbites and WhyU.

EdReady pilot testing began in several high schools and colleges in 2013. One of the early adopters was the University of Montana. Entering first-year college students were invited to use EdReady independently to boost their math placement scores. Of the students who completed their personalized study path in EdReady, 87% passed the University of Montana math-readiness exam and avoided remediation. These encouraging results led to the first statewide rollouts of EdReady in 2014 in Montana and Hawaii, with Nevada adopting EdReady for statewide rollout in 2015.

EdReady has also developed a companion effort for EdReady English that began national rollout earlier in 2015. However, the scope of the current evaluation is on EdReady's math offerings.

The Bill & Melinda Gates Foundation supported the development of EdReady and subsequently funded SRI to evaluate EdReady over the course of three years, fall 2014 through fall 2017. The evaluation has two overarching purposes:

1. to provide formative feedback to EdReady and the Foundation regarding opportunities to improve the design, functionality, and implementation of EdReady, and
2. to provide key evidence about the association between EdReady and the preparation of underprepared learners to meet postsecondary mathematics requirements.

Over the course of three years, SRI's evaluation of EdReady is intended to:

- identify key features of statewide and institution-level implementation of EdReady,
- study the relationship between the use of EdReady and performance on standardized tests of students' mathematical ability, and
- contribute to the evidence base regarding the use of solutions that integrate diagnostic assessment in support of transition programs to improve the entry phase into postsecondary education.

Purpose of This Report

This report was commissioned by the Bill & Melinda Gates Foundation to describe the uses of EdReady in schools and postsecondary institutions during the first 18 months of its public release. The report summarizes emerging lessons learned about streamlining adoption and implementation. Specifically, the report

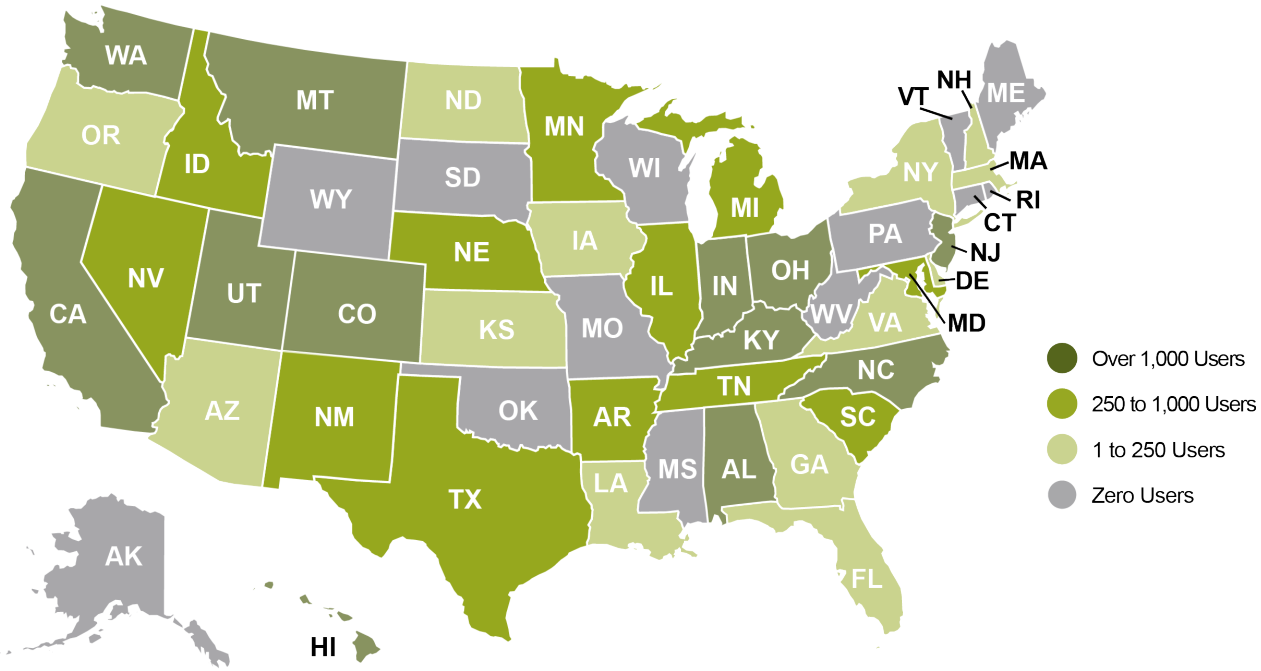
- describes dominant patterns of EdReady use based on interviews and discussions with a range of users as well as analysis of anonymous system log data,
- summarizes emerging data about the effect of EdReady on students' academic outcomes, and
- shares lessons learned from early adopters regarding readiness indicators, facilitators, and barriers to EdReady implementation.

II. A Closer Look at How EdReady Is Used

A Nationwide Snapshot

As of August 2015, EdReady reported that 62,700 students were enrolled in EdReady. About 22% of these students established user accounts through a public EdReady site, whereas the majority of these students (78%) had registered to use EdReady through customized, institution-specific portals in 47 states across the country (Exhibit 1). North Carolina has the most reported students (6,120), followed by Montana (5,817 students) and New Jersey (4,519 students).[8] These numbers roughly reflect the cumulative number of registered students in institutional versions of EdReady since its initial launch in Spring 2014. Furthermore, EdReady reports additional independent users who are not affiliated with an institution in every state. Of the 156 institutions that have registered to use EdReady according to EdReady use logs, more than half are postsecondary institutions (56%), and more than a quarter are high schools and K-12 districts (28%). About 10% appear to be online learning institutions, including eight virtual high schools and six virtual postsecondary institutions. Among the postsecondary institutions that have registered to use EdReady, most are 2-year colleges (61%), and about one-third are 4-year colleges (33%). A significant number of adult education programs are also experimenting with EdReady, although these are outside the scope of this report and were not included in this study.

Exhibit 1. A Snapshot of Nationwide EdReady Accounts, August 2015



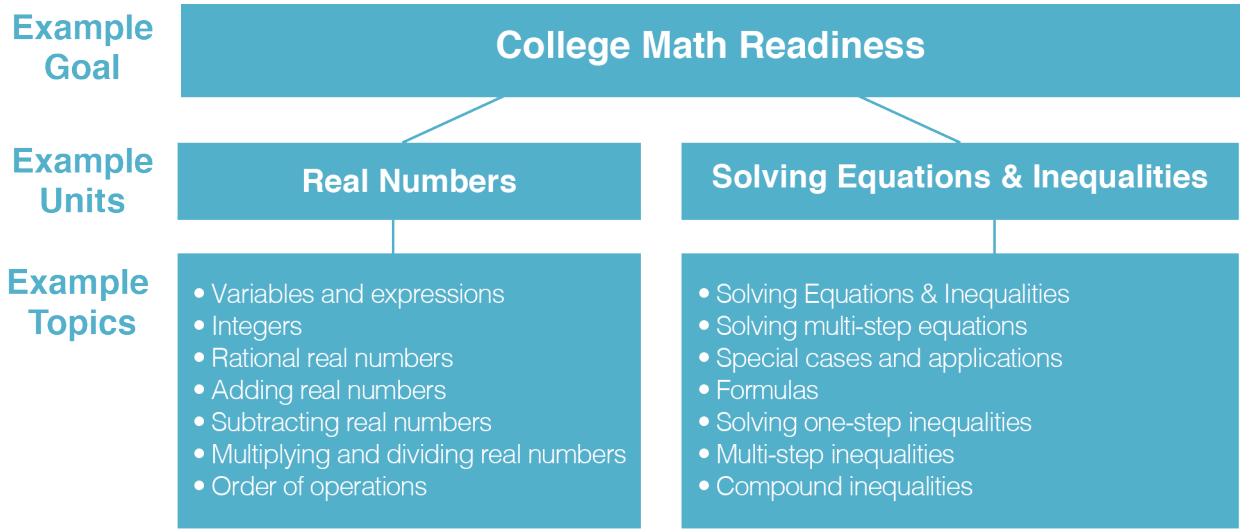
[8] The number of EdReady users by state was determined exclusively through backend data obtained from EdReady; the estimates include all documented users since EdReady's inception. High school and postsecondary status was determined through the named EdReady goal associated with each user. Most stated goals contained either an institution or program name.

The Instructor Experience

EdReady comes preloaded with 19 mathematical units, each consisting of a number of individual topics. The units and the topics that constitute them are also associated with specific curriculum modules. For example, the topic Adding and Subtracting Whole Numbers is part of the Whole Numbers unit, which falls under the Arithmetic module.

To set up EdReady for initial use, instructors or institutions select "goals" for their students to support a particular "readiness experience." Examples of goals that can be selected are College Math Readiness, Math Mastery for High School Students, and Placement Exam Preparation. One or more units can be chosen to comprise a goal, or the instructor or institution may use a preconfigured unit sequence with topics aligned with the desired goal (see Exhibit 2).

Exhibit 2. Example EdReady Goal with Preconfigured Units and Associated Topics



Real-time data dashboards and downloadable reports about student performance relative to the selected goal, units, and topics are available to teachers and administrators with appropriate permissions.[9]

EdReady was designed to be highly customizable. Instructors and institutions can adapt the default goals by changing, removing, or adding content. For example, a topic from one unit can be added to another if an instructor thinks it might assist students in mastering the content, or a unit and its topics can be removed from a unit or goal entirely. The scope, content, order, and number of assessments for each goal can also be modified.

[9] EdReady website www.edready.org Retrieved on November 18, 2015.

EdReady Instructor View: Using EdReady as a Supplement in Developmental Math Courses

Joan is a math instructor. For two semesters, she has used EdReady in her developmental math classes, both as a homework supplement and as a way to keep students on track if they miss a class. Joan spent considerable time integrating EdReady into her courses, previewing materials to ensure that she used the same terminology in class. Some students were initially resistant to using EdReady, particularly non-traditional age students who were less familiar with technology. For this reason, Joan now encourages students to become familiar with EdReady in advance and to come to class with questions. In-class time is spent on lectures and problem-solving. For homework, students are assigned the EdReady topic corresponding to what was covered in class and are required to take the EdReady assessments. Joan monitors their progress.

Joan mentions several advantages of using EdReady. Students who work ahead in EdReady can avoid taking further developmental courses; several have completed two courses in one semester, and one student progressed from the lowest level of developmental math to precalculus in a single term. Additional advantages include that EdReady is free to students and there is opportunity for students to repeat content and flexibility for them to work anywhere. A disadvantage is that some students try to click through the program, guessing on assessment questions until they get the correct answers so that they can move on.

The Student Experience

Students begin working toward an EdReady goal by taking a diagnostic pre-assessment to identify students' strengths and weaknesses associated with selected goals and topics. The system then generates a personalized study path through the units the student has yet to master. Students are able to see exactly which units and topics they need to study and which ones they work through. The study path shows students how to improve their knowledge and scores for the units they need to study and recommends the amount of time they should spend studying the unit. For each unit, students are presented with free online resources that are selected to address the constituent topics. The resources include several types of video lessons and interactive activities including Warm Up Questions, Overview Presentations, Worked Examples, Practice Problems, and Summative Reviews. Teachers also can include additional online resources for their students, such as Art of Problem Solving or other Khan Academy videos, from the EdReady library.

When students complete an EdReady topic lesson, they can check their knowledge by taking a short, approximately 5-minute topic assessment. Students can then take a longer, approximately 10-minute assessment that determines whether they have mastered the unit. For mastery, the student must achieve the specified target score on the topic or unit assessment. Mastery target scores can be set locally. A student's "score" is roughly equivalent to the proportion of units that the student has mastered for a particular goal. To complete their goals, students must reach a target score set by the instructor, typically 90 or 100.

Understanding Why Adopters Use EdReady

To understand how EdReady is being used by instructors and students, senior analysts at SRI's Center for Technology in Learning interviewed 57 people either in person or by telephone. These individuals represented 20 schools and colleges at varying stages of EdReady adoption and implementation. After synthesizing field notes from site visits to institutions and from interviews with instructors, program supervisors, students, and other school personnel, the SRI analysts developed six use cases from the data. This set of use cases is not intended to be (nor is it) exhaustive. Given EdReady's customizable nature, each of the six has many possible permutations.

Analysts also collected written and verbal reports of 13 EdReady pilots that were conducted independently by adopting sites and provided quantitative student outcomes. These were reviewed and organized according to use case and are described below with the associated use case. There is a table in the Appendix that lists key details about each study. Some of these studies were reported by NROC,[10] whereas others represented often informal efforts by institutions to describe their EdReady experience using available data. Although some of these studies reported promising results, the reports about EdReady use were descriptive in nature, and study designs did not inform causal statements about the use of EdReady and its impact on student learning. Therefore, these studies do not provide conclusive evidence as to whether EdReady produced learning gains beyond those that would result from regular instruction without the use of EdReady. Still, they are useful illustrations of what is possible using EdReady and can help to inform future research.[11]

The use cases presented below were intended to capture the intersection of large-scale current or potential use and alignment with national educational trends and needs. The use cases are presented here to provide concrete examples of how EdReady is being used by early adopters and to help organize and summarize emerging evidence from sites regarding their experience with EdReady. Information about student time logged in to the system is presented to help describe the range and intensity of use in sites, although more detailed information about how students are specifically using EdReady is not available.

[10] Montana Digital Academy and the University of Montana collaborative EdReady Pilot Study; Waipahu High School Early College and University of Hawaii collaborative EdReady Pilot Study; Utah EdReady Pilots: Independence High School and Park City High School.

[11] SRI is working with sites adopting EdReady in the 2015-2016 school year to generate more rigorous studies of the effect of EdReady on student learning.

EdReady Use Cases

1. Test preparation for high school students.
2. In-school use by middle and high school instructors.
3. Supplement to postsecondary developmental math courses.
4. Curricular base for transitional bridge or boot-camp programs.
5. Use in postsecondary credit-bearing courses.
6. Independent student use.

1. High School Test Preparation

High schools are using EdReady to prepare students for mathematics placement or achievement tests. For this purpose, EdReady is typically used outside core courses, often in a school-based computer lab. Waipahu High School in Hawaii is an example of how EdReady can be used to prepare students for placement exams.

The Early College program at Waipahu High School allows students to take courses for college credit while still in high school. Waipahu High School began using EdReady for math remediation after observing that many of their students were starting college programs without the necessary math skills for success. According to an administrator at Waipahu High School, students demonstrated such positive improvements during the summer pilot that use of EdReady was extended into the following school year. Starting in fall of 2014, any student wishing to register for a dual-credit math course had to log 20 hours of time in EdReady or reach a target score of 85 percent. Students received check-ins and support from administrators and the University of Hawaii Online Learning Academy Cybermentors, who sent them weekly progress emails. According to EdReady records, up to now 242 Waipahu High School students have logged on to EdReady for this purpose, averaging 12 sessions of about 48 minutes each, for a total of about 10 hours of EdReady use per student.

Waipahu High School Early College conducted a pilot study in collaboration with the University of Hawaii during the summer and fall of 2014 that included 98 Early College students. Waipahu reported that 65 percent of students who took the COMPASS college math placement exam after using EdReady qualified for enrollment in college-level, dual-credit math courses, compared with 41 percent of students who did not use EdReady the previous year. They also found that 13 of 17 students (76 percent) who took the COMPASS exam both before and after using EdReady moved up at least one placement level.

In the summer of 2015, the Upward Bound TRIO program at Nevada State College (NSC) began using EdReady to help high school students prepare for the ACT, which all Nevada high school students are required to take as of 2014-2015. TRIO is a federally funded outreach program to promote college matriculation, course completion, and reduce need for remediation among high school students at academic risk. TRIO provides many student supports,

including EdReady. For about one month during the summer of 2015, TRIO students used EdReady in a computer lab on the NSC campus with a staff facilitator. According to EdReady data, TRIO students averaged eight sessions and a total of 4.5 hours using EdReady. Nevada State College reports that of the 49 TRIO students who enrolled in EdReady, 39% showed improvement on their EdReady scores.

2. In-School Use by Middle and High School Instructors

Some middle and high schools implement EdReady within formal math courses, often for skills recovery or for diagnostic purposes. In this model, teachers use EdReady both to identify student needs and to supplement their regular instruction with resources targeted at individual students' skill deficits. For example, Independence High School in North Carolina has enrolled 117 students using EdReady as a supplement to its Foundations of Math course, according to EdReady records. This course provides a survey of basic mathematical concepts, including whole numbers and graphing. Foundations of Math students average 19 sessions of about 47 minutes each, for a total of about 15 hours of EdReady use.

High schools in Kentucky offer another example of student use of EdReady as part of a math course. In Kentucky, every high school junior takes the ACT to determine college and career readiness. For those who are not college and career ready, schools are required to provide senior-year interventions. High schools often struggle to provide these interventions for math skills and are looking for something that can be aligned with school standards and also be personalized with diagnostics. EdReady is one of the tools that Kentucky high schools are implementing to address this need.

Five middle and high schools have reported pilot evidence of the outcomes of co-curricular EdReady use (see Appendix A). Of these, three involved special learning populations—students learning English as a second language (LEAP Academy), pregnant teens and young mothers (AGAPE), and those attending an alternative high school (Independence). All five reported learning gains with EdReady use. None of the pilots, however, included a comparison group.

In 2015-16, the Saint Paul Public Schools' alternative students will be using EdReady at four sites. EdReady will be used in-school by instructors at three of those sites, and the fourth site will be a curricular support for a bridge program located at St. Paul College called Gateway to College. The three in-school sites include LEAP Academy and AGAPE (mentioned above), and Gordon Parks High School, an alternative high school for students struggling to graduate on time. The school district is crafting use cases of EdReady that are tailored for use in each setting, and anticipates even more student growth this year.

3. Supplement to Postsecondary Developmental Math Course

Some postsecondary institutions use EdReady in conjunction with their developmental math programs. These programs often take one of two forms:

1. Instructors may implement EdReady as an online course supplement for students in a developmental math course.
2. College students may use EdReady to improve their math placement scores in order to bypass developmental math and enroll in a credit-bearing course or enroll in a higher level of developmental math.

These uses can be blended to include some classroom instruction or programs can be taken fully online.

For example, instructors at Highlands College in Montana have implemented EdReady in the developmental courses Basic Math Readiness, Introduction to Algebra, and Intermediate Algebra. According to EdReady use logs, 430 Highlands students have used EdReady with their developmental math courses, averaging about 40 sessions at around 29 minutes per session, or about 20 total hours of use per student. Instructors used EdReady as a homework supplement and in blended classroom formats, for example, to enable students to work at different paces.

Using EdReady as a Supplement in Developmental Math Courses: Jacksonville State University

Jacksonville State University (JSU) has had well over 1,000 students use EdReady for developmental math. In the summer of 2014, EdReady was incorporated into the university orientation so that the first math assessment for every student was from EdReady. EdReady staff worked with JSU to design specific study paths for the different math courses required for all majors so that the university could let students know exactly where they need review and practice. Last year was a pilot phase, and according to a professor at JSU, they have been "all in" since August 2015. JSU is still in the process of tracking students to see how well they are prepared for their later math courses.

Three colleges have reported pilot results for EdReady implementation with developmental math students (see Appendix A). Two larger pilot implementations using EdReady reported improvements over previous years:

- Jacksonville State University reported improvements in pass rates for developmental math, and
- Highlands College saw improvements in both course completion and progression rates.

In addition, Owensboro Community and Technical College specifically targeted 11 students who had not passed developmental math after trying for at least one semester and found that eight of them improved with EdReady; some were able to bypass developmental math courses entirely. This evidence is encouraging, but with such a small sample it is not clear whether these findings would generalize to additional students or settings.

4. Curricular Base for Transitional Bridge or Boot Camp Programs

EdReady is also used as a curricular support for bridge programs offered to incoming freshmen at postsecondary institutions. Typically, students take an intensive summer math course for 2–4 weeks to improve their math placement scores before entering college. EdReady has been used in bridge programs that are blended mixes of online and classroom instruction as well as in fully online bridge programs.

Honolulu Community College (HCC) developed a summer boot camp to reduce the need for remedial math courses among incoming students. The boot camp is open to all HCC students who place below 100-level math on the COMPASS placement exam. Instructors report that each 3-hour boot camp session begins with 45 minutes of instruction, followed by 2.25 hours of EdReady use. Instructors provide additional practice items targeted to the COMPASS. Students work through EdReady independently, while instructors walk around to monitor their progress and provide assistance. Students who complete the math boot camp can retake the COMPASS to place into a higher level math course, potentially saving the cost ($610) and time (90 hours) of a remedial course. EdReady use logs indicated that the program enrolled 55 students in summer 2015. These students averaged about 36 sessions of about 53 minutes each, for a total average of 31 hours of EdReady use.

Three institutions reported on EdReady pilots in bridge programs (see Appendix). Two offered these programs to recent high school graduates broadly, whereas the third targeted students with a specific need for EdReady, such as test scores near the cutoff to qualify for a higher level course. All three pilots reported learning gains with EdReady use. Only one included a comparison group: Gallatin College reported higher placement-test pass rates and credit-bearing math course enrollment compared with business as usual.

5. Use in Postsecondary Credit-Bearing Courses

Postsecondary institutions are also using EdReady with students enrolled in non-developmental (i.e., credit-bearing) math courses. In these cases, primary instruction for the course is typically in the classroom, with EdReady used as a supplemental resource. Provision of co-curricular supports has emerged as a leading strategy for reducing reliance on developmental courses to address learning gaps. Rather than requiring students to take and pass developmental mathematics before beginning credit-bearing courses requiring a math competence, this model allows students to start their degree programs with EdReady available for just-in-time instruction in areas of mathematics where they are weak.

For example, University of Montana instructors have adopted EdReady as an extra support for students in several courses, including Probability and Linear Math, College Algebra, and Precalculus. One math professor encourages calculus students to use EdReady to fill gaps in their algebra skills. In her experience, EdReady use can prevent students from becoming discouraged by early failures, enabling them to pursue further studies. EdReady use logs indicated a total of 475 University of Montana students using EdReady for co-curricular purposes. These students spent an average of 30 minutes per EdReady session, although students varied widely in their number of log-ins (from 1 to 80) and total EdReady use (from less than 1 minute to 31 hours). This variability could be attributable to differences in whether EdReady use was required by instructors or merely offered as an optional supplement.

6. Independent Student Use

Students may also use EdReady independently, outside a course or program, to improve their course readiness or prepare for tests. The EdReady website is available to individual students at no cost. Alternatively, students may use EdReady through an affiliated institution to access customized assessments and learning paths but work independently at their own pace. These uses are the most difficult to track and measure. However, EdReady's system use data suggest that as many as 13,452 EdReady students are not affiliated with an institution. For example, 207 students in Montana have used EdReady independently for a variety of purposes, including middle through postsecondary math readiness, as well as ACT and college-placement test preparation. These independent students tended to spend about 25 minutes per EdReady session, but they varied widely in number of log-ins (from 1 to 70) and total EdReady use (from less than 1 minute to 32 hours).

III. Exploring Opportunities for Statewide Adoption

The decision to adopt EdReady can be made at multiple levels, from individual students, teachers, and faculty members to math departments to school districts to state-level bodies responsible for coordinating policy and encouraging innovation. These entities have different decision-making rights—students enrolling directly make decisions about how to use their discretionary time, and individual faculty members typically decide what resources they want to use in their own courses but have limited ability to influence policy decisions. High-level administrative bodies can purchase statewide licenses for technology use in higher education but rarely have the ability to mandate its use. Nonetheless, state agencies can serve as powerful catalysts for the adoption of a new learning technology such as EdReady by corralling resources, providing support, and promoting visibility. This section explores statewide adoption paths by profiling four states at various stages of adoption and evolution:

- Hawaii,
- Montana,
- Nevada, and
- North Carolina.

Montana and Hawaii were relatively early adopters of EdReady, North Carolina picked up the system more recently but has already generated the largest number of student accounts, and Nevada is in the early stages of rollout (Exhibit 3).

Exhibit 3. Statewide EdReady Adoptions as of August 2015

State	Middle School		High School		Postsecondary		Active Students
	Schools	Students	Schools	Students	Schools	Students	
Hawaii	0	0	13	914	10	1,807	3,219
Montana	41	1,487	54	1,999	13	1,921	5,817
Nevada	0	0	1	51	3	673	784
North Carolina	0	0	10	1,337	1	4,216	6,120

Note 1. High school and postsecondary classifications were inferred from students' goal names; they are somewhat imprecise, and not all students could be classified in this way.

Note 2. Active students include students whose institution types could not be inferred from names of their EdReady goals.

Following are overviews of EdReady activity in each of the four states.

Hawaii

EdReady use in Hawaii is often tied to test preparation. Its use appears to be motivated at least in part by statewide policies that require (1) students to pass the ACT to graduate from high school, and (2) institutions to use the COMPASS exam to place students in developmentally appropriate mathematics courses.

Use of EdReady in Hawaii is managed and facilitated by The Online Learning Academy (OLA). Based at the University of Hawaii at Mānoa, OLA

- is a statewide system that serves all K-12, community college, and university students and
- provides free online math, science, and writing tutoring, high school and college math-readiness preparation, and pre-college mentorship.

OLA uses EdReady as a tool to support developmental and remedial education in high schools, community colleges, and the University of Hawaii system. The context for use varies, from adult skills training and college math boot-camp programs to preparation for enrollment in early college high school courses. All students who use EdReady (including college and high school students) in Hawaii have access to "cybermentors" recruited by OLA from the University of Hawaii, who support EdReady students working toward their target score for improving math readiness.[12] OLA has partnered with other Hawaii institutions to

- deploy EdReady in ACT, SAT, and COMPASS math prep programs;[13]
- provide undergraduate students from the University of Hawaii-Mānoa as cybermentors; and
- facilitate cybermentors' support of EdReady students through one-to-one or group tutoring, academic coaching, and weekly checkups to discuss progress in the EdReady program.

To date, EdReady is being used in 10 postsecondary institutions (1,807 students) and 13 high schools (914 students of Hawaii users), with over 3,200 user accounts statewide. OLA plans to offer English language instruction support using EdReady Developmental English starting in January 2016.

Montana

EdReady gained an early foothold in Montana through oversight by the Montana Digital Academy (MTDA), a public state virtual school. In the past 2 years, EdReady has been adopted in more than 100 middle schools, high schools, and postsecondary institutions across the state, generating nearly 6,000 user accounts since the service was introduced in 2013. Of the four profiled states, Montana alone has a significant number of middle-school adoptions—approximately one quarter of all user accounts. In addition, about a dozen sites in Montana are using EdReady in adult basic-education programs.

[12] UH EdReady Support FAQ webpage http://uhedreadysupport.weebly.com/faqs.html Retrieved on November 18, 2015.

[13] UH at Mānoa Online Learning Academy: EdReady Hawaii webpage http://manoa.hawaii.edu/ola/programs/edready.php Retrieved on November 18, 2015.

Pilot studies of EdReady use in summer bridge programs at University of Montana (UM) and Gallatin College have produced some encouraging results. Highlands College in Butte has integrated EdReady into developmental math courses, and initial findings were that outcomes for EdReady students were comparable or slightly better than those for students in prior developmental math sections that used commercial products costing students as much as $120 each.

EdReady is currently managed and facilitated by the MTDA, which is based at UM. The MTDA serves K-12 students by offering supplementary online curricula, and it supports almost every high school in the state and many middle schools. The MTDA is charged with filling statewide gaps in math readiness through the adoption of EdReady Montana, acting as liaison with K-12 schools or college and university personnel who facilitate EdReady locally, and working with local school staff to customize EdReady goals for their students.[14] In addition, the MTDA has worked with and advised the NROC Project on the creation of math curricular resources.

EdReady's statewide rollout in Montana has been facilitated by a $2.4 million grant to MTDA from the Dennis and Phyllis Washington Foundation.[15] These funds have enabled MTDA to

- increase awareness of EdReady and its potential uses in both secondary and postsecondary education;
- provide training and implementation support, including setting up customized versions of EdReady; and
- work with education institutions to compile and analyze data on student EdReady use and outcomes.

Nevada

As of August 2015, Nevada was at the early stages of EdReady implementation. To date, 784 students in Nevada have registered EdReady accounts. Three Nevada institutions have more than 10 registered EdReady users: College of Southern Nevada, Great Basin College, and Nevada State College. College of Southern Nevada has the most registered users in the state (67%), followed by Great Basin College (17%), and Nevada State (12%). EdReady is managed and facilitated at the state level by the Nevada System of Higher Education (NSHE). NSHE is charged generally with supporting institutions including University of Nevada, Las Vegas; University of Nevada, Reno; Nevada State College; College of Southern Nevada; Great Basin College; Truckee Meadows Community College; and Western Nevada College.

NSHE began providing all Nevada students and instructors with access to EdReady online courses and materials through membership in the NROC Project in spring 2015. Instructors are able to customize EdReady offerings for remedial mathematics.[16] As part of the initiative, NSHE is

- providing public schools in participating districts with access to EdReady ACT mathematics preparation for grades 11-12,[17]

[14] EdReady Montana Website http://edreadymontana.org/ Retrieved on November 18, 2015.

[15] University of Montana website (2014, March 6). Dennis and Phyllis Washington Foundation Provides $2.4 Million for Statewide Online College-Prep Curriculum. University of Montana News. http://news.umt.edu/2014/03/030614edrd.aspx Retrieved on November 18, 2015.

[16] Nevada System of Higher Education. (2015). Expanding by Degrees: NSHE's Role in Building a New Nevada. http://system.nevada.edu/Nshe/index.cfm/data-reports/legislative-reports1/nshe-strategic-plan-expanding-by-degrees/ Retrieved on October 1, 2015.

[17] EdReady Nevada: Secondary Schools. (n.d.). http://edreadynevada.org/secondary-schools/ Retrieved on October 1, 2015.

- enabling individuals not currently in high school or college to sign up with EdReady Nevada to pursue individual math improvement goals, and
- providing customizable versions of EdReady Nevada to all colleges and universities in Nevada to help prepare students for college-level math.

As of September 2015, Nevada higher-education institutions with customized EdReady websites are: Great Basin College; Nevada State College; the College of Southern Nevada; the University of Nevada, Las Vegas; Truckee Meadows Community College; the University of Nevada, Reno; and Western Nevada College.[18]

EdReady rollout to date in Nevada has included presentations to higher-education faculty and administrators; and small-scale, local pilots with the intention to expand in the coming year. In addition, College of Southern Nevada and Great Basin College have encouraged all incoming students to use EdReady for ACCUPLACER preparation.

North Carolina

As of August 2015, North Carolina had 6,120 students enrolled in EdReady, including 1,337 students at 10 high schools and 4,216 students enrolled through Central Piedmont Community College (CPCC). CPCC has been a driver of EdReady implementation in North Carolina, both by encouraging EdReady use among its students and by facilitating its integration at area high schools.

CPCC began using EdReady to help its incoming students prepare for the North Carolina Diagnostic Assessment and Placement Test (NCDAP). Administrators and faculty appreciated that EdReady could be tailored to align with the NCDAP and that it was available to any user, unlike similar programs that are restricted to students currently enrolled at the college. CPCC encourages but does not require students to use EdReady as a math refresher before taking the NCDAP for the first time. Students who opt to retake the NCDAP to obtain a higher score, however, are required to first achieve a target EdReady score. CPCC reported that that NCDAP scores improve with EdReady use.

In 2012, CPCC received funding from the League for Innovation in the Community College to address gaps between its math curriculum and the curricula of local high schools. It found that high school math courses were less likely than those at the college level to integrate technology. To address this discrepancy, CPCC drew on its positive EdReady experiences to facilitate EdReady implementation in 10 local high schools. CPCC worked with high school teachers to align EdReady content with their curricula. The teachers' implementations took different directions, with EdReady used in class or in study hall, as a remediation tool, or to accelerate advanced learners. CPCC hopes to continue and expand its EdReady outreach to high schools. In the 2015-2016 school year, CPCC is providing teacher professional development for the use of EdReady in Math 1 classes at three local high schools. CPCC views these high school outreach initiatives as consistent with state legislation encouraging the use of educational technology and promoting developmental math education in high schools.

[18] EdReady Nevada: Higher Education. (n.d.) http://edreadynevada.org/highered/ Retrieved on October 1, 2015.

Promising State-level Readiness Indicators

At the same time, merely licensing statewide access to EdReady clearly is not sufficient to drive local usage. Below are five state-level policy indicators that suggest an educational context that is well suited to EdReady adoption:

K20 reforms that focus on preparedness and mastery. Some states emphasize college-readiness preparation, for example, by requiring that high schools offer a college-preparatory curriculum or align their required credits with postsecondary institutions.

Policy focus on open educational resources. When high-level administrators and policymakers push for the use of open educational resources (OER), education providers are more motivated to consider adopting EdReady rather than a commercially available alternative.

Efforts to streamline developmental education. When states launch efforts to streamline or compress developmental education so students enroll in credit-bearing college courses faster, schools may consider EdReady as a flexible tool for achieving this goal.

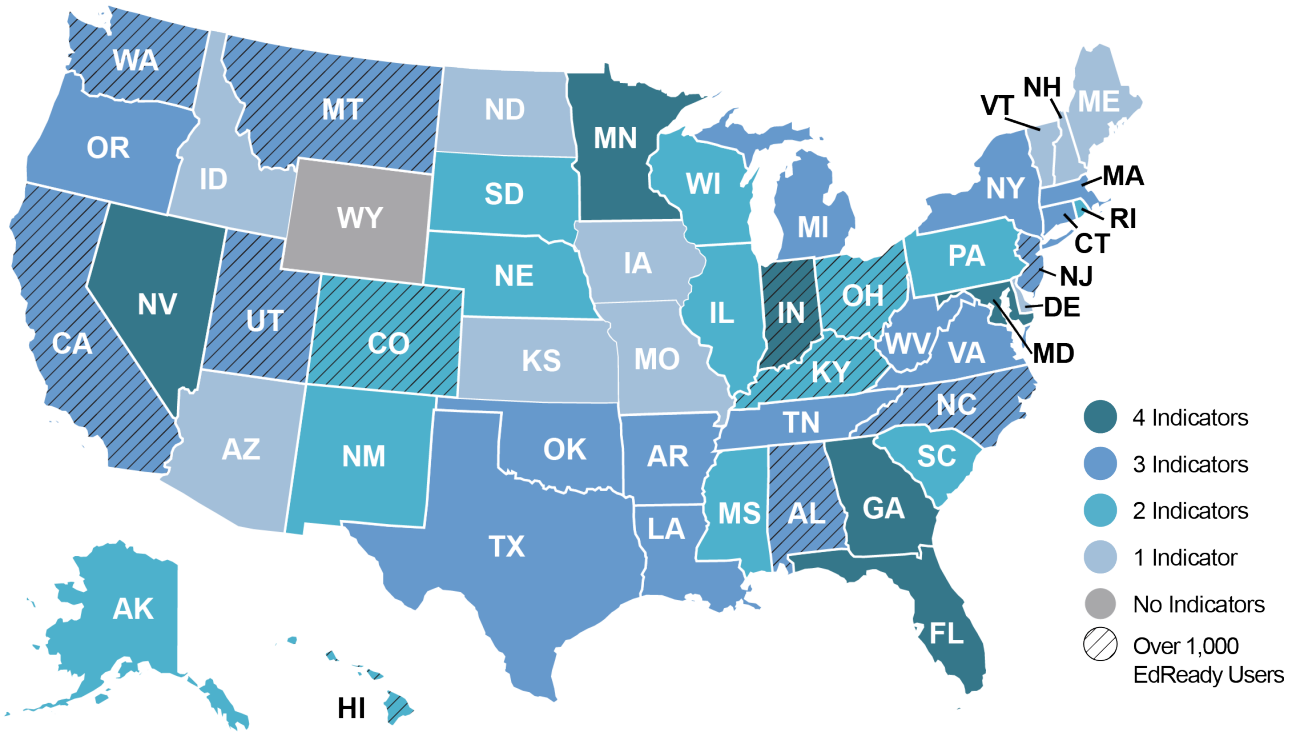
States that do not allow 4-year institutions to offer or require developmental education. Moves by legislators to get 4-year colleges out of developmental education appear to generate interest in EdReady as part of a strategy for enrolling students who otherwise would need to go to community colleges for remediation.

States with high school exit exams. Some states require all high school students to pass standardized tests in order to graduate. These tests are intended to verify that all high school graduates have mastered a core curriculum. Because EdReady contents can be tailored to a variety of assessments, states may consider developing EdReady goals to promote exit exam readiness.

SRI researchers scanned all 50 states for data on the presence or absence of each indicator (Exhibit 4). These data confirmed that states with more of these readiness indicators tend to have more students enrolled in EdReady, as reflected in EdReady use logs.[19] No states were found to possess all five indicators; 12% of states had four indicators, 38% of had three indicators, 28% had two indicators, 20% had one indicator, and one state (Wyoming) had no indicators. Of the six states found to possess four readiness indicators, one—Nevada—is currently implementing EdReady statewide. The remaining five—Florida, Georgia, Indiana, Maryland, and Minnesota—may be good prospects for future expansion.

[19] User totals reported by EdReady correlated moderately with the number of readiness indicators present, $r_s = .41$, $p < .01$.

Exhibit 4. Nationwide State-Readiness Indicators and EdReady Adoption



Note: No states were found to have all five indicators.

The rest of this section provides detailed descriptions of each of the five readiness indicators.

K20 Reforms that Focus on Preparedness and Mastery

A number of high schools, including those offering early college courses, are seeking to ease students' transition from high school to college by starting admissions and placement test preparation earlier and adopting programs to ensure students are college ready before they graduate.

This trend is fairly pervasive. SRI analysts identified 24 states that either require all high school students to take a college-preparatory curriculum or stipulate that credits required for high school graduation be aligned with the state's postsecondary system.[20] Additionally, Connecticut has plans to require college-preparatory curricula for all high school students beginning with the class of 2020.

[20] National Center for Education Statistics. (n.d.) Table 5.9. Types of state high school policies for college readiness, by state: 2012-2013. https://nces.ed.gov/programs/statereform/tab5_9.asp Retrieved November 18, 2015.

Policy Focus on Open Educational Resources

EdReady is entering a market that is already fairly well penetrated by commercial providers that have several significant advantages. First, their products have been in use for a long time and are tuned to the needs of specific audiences and use cases. Second, commercial providers have marketing resources to promote awareness and brand loyalty, not to mention selling district or statewide contracts. Third, they have technical and support services in place for instructors (or at least a perception that such services are available when needed). Perhaps most important, they have a huge installed base of users who are familiar with their products and have already invested the time to incorporate them into their courses. Some commercial software products align with (and often come bundled with) widely used textbooks.

In the absence of a policy push toward OER, the fact that EdReady costs a fraction of the commercial products is not always enough to tip the scale. The savings accrue to the students, but instructors are the ones who usually choose what resources to use in their courses and bear the costs of revising their courses for a new platform. Some instructors do consider EdReady's low cost to students as important, but others have a strong inclination to remain with a familiar, widely accepted product. There is also a concern that OERs lack technical support and longevity. Confidence in EdReady's ability to provide support and in its sustainability will be increasingly important as it seeks to expand beyond early adopters to instructors with a neutral or even negative perception of OERs.

When high-level administrators and policymakers push for open educational resources, they can create motivation to consider adopting EdReady. For example, strategic initiatives in the University of Hawaii Community College system that call for increased use of OERs may result in greater EdReady adoption over continued use of fee-bearing commercial products. The University of Maryland University College president's encouragement to use OERs influenced the decision to pilot EdReady.

Enacted legislation is the clearest evidence of a concerted policy focus on open educational resources. Only five states—California, Florida, Minnesota, North Dakota, and Washington—have passed such laws.[21,22,23] Washington has passed the most extensive legislation in support of OERs, requiring faculty and staff to consider adopting OERs and funding an OER library, among other initiatives.[24] North Carolina is also developing rules in support of OER implementation.

Nine states (including two with legislation and seven with other supportive policies) signal clear support for OERs, typically by developing or compiling OERs for state educators. For example, Illinois Open Educational Resources[25] is a searchable online database of OERs for individuals, schools, and organizations. Users can search for open resources by Illinois and Common Core learning standards for each grade level.

[21] Open Access Textbook Project. (n.d.). Open access textbook and OER legislation and policy http://www.openaccesstextbooks.org/legislation.html Retrieved November 18, 2015.

[22] Patrick, S., & Bliss, T. J. (2013). *OER state policy in K-12 education: Benefits, strategies, and recommendations for open access, open sharing.* Vienna, VA: iNACOL. http://www.inacol.org/resource/oer-state-policy-in-k-12-education-benefits-strategies-and-recommendations-for-open-access-open-sharing/ Retrieved November 18, 2015.

[23] State Education Policy Center (n.d.) Open educational resources. http://sepc.setda.org/topic/instructional-materials/open-educational-resources/ Retrieved September 7, 2015.

[24] Millard, M. (2014). *Open-source textbooks can help drive down the overall cost of college.* Denver, CO: Education Commission of the States. http://www.ecs.org/clearinghouse/01/14/37/11437.pdf Retrieved November 18, 2015.

[25] Illinois Open Educational Resources website http://ioer.ilsharedlearning.org/ Retrieved November 18, 2015.

Efforts to Streamline Developmental Education

Many states are launching efforts to streamline or compress developmental education so students enter credit-bearing college courses faster. Colorado has reduced developmental math levels from four to two. Some states are introducing accelerated developmental education courses on mastery and summer boot camps, which typically enroll incoming freshmen and last only a few weeks. EdReady may fit with the goals of institutions that are pursuing these approaches because the system is mastery-based and described by some instructors as being more streamlined than traditional resources used in developmental courses.

Nine states show clear evidence of statewide efforts to accelerate developmental education.[26] For example, Arkansas, Connecticut, and Michigan have adopted the Accelerated Learning Program, developed at Community College Baltimore County, to mainstream students who would otherwise have been placed in developmental education.[27]

Although statewide accelerated developmental education is still relatively rare, individual postsecondary institutions in 41 states offer accelerated developmental courses. For instance, Jacksonville State College in Tennessee has Smart Math, an individualized accelerated developmental mathematics curriculum.[28]

States Prohibiting Four-year Institutions from Requiring or Offering Developmental Education

Moves by legislators to force changes on developmental programs may generate interest in co-curricular resources and diagnostics such as EdReady. Ten states (Colorado, Connecticut, Florida, Indiana, Minnesota, Montana, Nevada, North Carolina, Tennessee, and West Virginia) have enacted or are actively considering such policy changes.[29] For example, Tennessee community colleges are required to provide corequisite remediation, whereby students can opt out of remedial math and instead have access to tutoring and other supports in college-level math courses. Likewise, Minnesota legislators are considering a proposal to require that postsecondary institutions offer corequisite remediation.

[26] Institute of Education Sciences. (2015). *SLDS topical webinar summary: Adult education and postsecondary collaboration regarding remedial and developmental education.* Washington, D.C.

[27] Accelerated Learning Program. (n.d.). ALP schools. http://alp-deved.org/alp-schools-directory/?state=&s= Retrieved November 18, 2015.

[28] Nodine, T., Dadgar, M., Venezia, A., & Bracco, K. R. (2013). *Acceleration in developmental education. San Francisco, CA: WestEd.* http://www.wested.org/online_pubs/resource1281.pdf Retrieved November 18, 2015.

[29] Smith, A. A. (2015, May). Legislative fixes for remediation. Inside Higher Ed. https://www.insidehighered.com/news/2015/05/08/states-and-colleges-increasingly-seek-alter-remedial-classes Retrieved November 18, 2015.

States with High School Exit Exams

In states where high school students must pass a standardized exam to graduate, schools may see EdReady as a flexible, customizable tool for exit exam preparation. Currently, 24 states use high school exit exams.[30] While these exit exams vary in subject coverage, the majority include some math.[31] Math coverage does differ by state, however; for example exit exams in Arkansas, Indiana, and Mississippi test only Algebra I, whereas Oklahoma's exit exam also includes Algebra II and geometry. States may therefore appreciate that EdReady allows for content customization, allowing for the development of EdReady goals tailored to exit exam topics.

[30] National Center for Education Statistics. (n.d.) Table 5.4. Types of promotion and graduation practices based on statewide exit and end-of-course exams, by state: 2013 http://nces.ed.gov/programs/statereform/tab5_4.asp Retrieved November 18, 2015.

[31] National Center for Education Statistics. (n.d.) Table 5.5. State high school exit exams, by exam characteristics and state: 2011–12 http://nces.ed.gov/programs/statereform/tab5_5.asp#f4 Retrieved November 18, 2015.

IV. Lessons Learned About Strong Institutional Implementations

Reflecting on the first 18 months of EdReady use through our review of pilot data, visits to adopting institutions, and interviews with EdReady program administrators, coaches, and instructors, SRI researchers have observed six important lessons learned about implementation of EdReady.

Find a Local Champion

A key ingredient for successful rollout of a product like EdReady is the emergence of local champions who have

- a strong sense of the system's potential benefits and how it could work in their institution, and
- the willingness and wherewithal to navigate bureaucratic hurdles and build support among colleagues.

The benefits of local champions were illustrated in Highlands College in Montana, where a faculty member both persuaded her math department colleges to try EdReady in developmental math courses and secured administrative backing. Faculty champions are especially crucial because no new system can gain traction, particularly in postsecondary education, through top-down mandates alone.

Generate Buy-in Among Multiple Stakeholders

Individual champions are important, but given the complexity of education systems, so is generating the support of individuals who play different functions related to technology-based curriculum and instruction. For example, the Program Manager for College and Career Readiness at the St. Paul Public School District in Minnesota developed an interest in implementing EdReady after attending an NROC annual meeting. She included her supervisor and the principal in charge of alternative education for the school district in an initial conversation about the adoption of EdReady. Individual school principals, math teachers, and department directors were also involved in high-level communications about using the system. Initial reactions from pilot schools have been positive, and the lead administrator is optimistic that EdReady will eventually gain wider adoption across the district.

Find Potential Users Seeking Flexibility

EdReady appears well positioned for adoption among institutions that are seeking a flexible diagnostic and support tool because it supports customized branding, math goals, and pathways. Instructors are able to customize assessments and the content of learning pathways to match their course content and the needs of their students, and some go so far as to embed elements of EdReady within their local course management systems. As a

result, one instructor commented that EdReady can appear as an integrated courseware feature, as opposed to other online resources that feel distinctly external. EdReady's advantage over other software options is clearest for instructors seeking this level of tool integration. Instructors can fully exploit EdReady's flexibility when making significant revisions to courses or programs instead of simply including EdReady as an optional or supplemental resource. At the same time, taking advantage of this degree of flexibility requires instructors to have a clear vision for integrating the tool in pursuit of well-defined learning objectives. Instructors are unlikely to take action if they have only a general interest in EdReady but lack a clear concept of their instructional goals or of how EdReady could serve them. This is also true for instructors who lack the technical knowledge or ready access to support staff to set up a customized EdReady curriculum.

Provide Professional Development and Technical Assistance

It should not be assumed that instructors will know how to adapt EdReady for their local goals or how to implement a quality online or blended learning program. The most successful rollouts made provision for professional development or coaching. At schools in Owensboro, Kentucky, for example, College and Career Readiness coaches received support from professional development staff in the implementation of EdReady. The professional development staff worked with the coaches to develop a localized plan for implementing EdReady in each school based on their available resources, thus enabling EdReady to take off successfully in these schools. The manager of College and Career Readiness at Owensboro attributed EdReady's success in the schools to their collaborative approach to professional development.

Additional faculty training may be needed in instances where EdReady adoption coincides with significant redesign of a program and changes to the instructional model. For example, at Jacksonville State University, EdReady was incorporated into an overhaul of the developmental math sequence. The program coordinator realized that instructors needed more guidance on how to teach using the new flipped-classroom model and developed a concrete framework for implementing it. They also provided 4 hours of instructor training at the beginning of the semester that included orientation on the EdReady system overall, how to monitor student progress, and tips on instructional strategy. In addition, they hold short informal meetings occasionally to give EdReady instructors a chance to talk about what they are doing, options for using class time, and teaching methods. Several respondents identified these trainings as a very valuable feedback loop for the instructors and their administrator to learn about things that did not work as expected. This led Jacksonville State to release a training manual to share what it learned in the form of best practices, teaching tips, and how to respond to common challenges and questions from students. Everyone who teaches developmental math will receive the manual.

As a community-based nonprofit organization, NROC does not have the resources to post account managers in every state. Thus, implementation assistance must be provided either locally or via other designated entities to show instructors how EdReady can help to achieve their goals and take them through the implementation steps. Certain institutions have the internal capacity to handle these tasks (University of Maryland University College and Chattanooga State Community College, for example), but most need access to some type of external support provider. To illustrate, adoption in one state with a statewide license to EdReady has been limited to one county with

an exceptionally capable individual. In other areas of the state, instructors have become stuck on such issues as how to set up a local account, how EdReady interfaces with their local campus learning management system, and how it compares with other programs. The state administrator believes access to local technical assistance from a well-trained individual who could go to colleges and work with faculty to show them how flexible the program is would result in a quicker, more successful EdReady rollout.

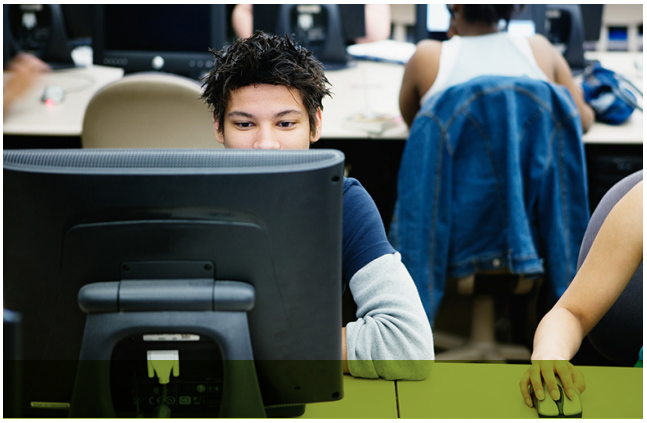
New adopters of a tool like EdReady do not necessarily need to provide all the professional development and technical assistance on their own. The Montana Digital Academy has provided this support in Montana. Institutions may also support one another in implementing EdReady. Central Piedmont Community College in North Carolina is supporting EdReady implementation in local high schools as part of an initiative to improve math curriculum alignment. CPCC provides teacher professional development on customizing EdReady to high school mathematics curricula. These high schools had previously implemented few, if any, educational technologies in mathematics. Therefore, CPCC's support may be a key ingredient in their rollout of EdReady.

Ensure Adequate and Equitable Student Access and Support

Institutions also vary in their technical infrastructure or plans for student access. In schools that have a computer available for each student, students may have more opportunities to use EdReady in class with instructor facilitation. Implementing EdReady in contexts where one-to-one computing is readily available is likely to limit logistical barriers than schools with a higher student-computer ratio might face. Mobile carts of Internet-capable laptops are an option for supporting in-class use of EdReady when computer labs are not available. When school-owned equipment and Internet access are not available, EdReady access depends on whether the student owns an Internet-connected device. In Hawaii, institutions in rural regions often have insufficient Internet connectivity to use EdReady effectively and productively. It is not uncommon for students in these areas to create and share their own Internet hotspots by connecting to their mobile devices. One school with few computer labs reported creating paper workbooks for students who did not have their own devices.

Although student-level supports are likely to impact EdReady adoption, it is too early to tell which student supports are truly effective. States are experimenting with a variety of supports for students. In Hawaii, students can work with cybermentors who provide free, one-on-one tutoring support for math. In North Carolina, educators in Charlotte-Mecklenburg County hope that continuous exposure to EdReady from high school through college will encourage students to take advantage of it. There are also financial incentives: In both North Carolina and Hawaii, students can have their COMPASS fee waived if they complete an EdReady program before retaking the test. In both states, students are reminded about the savings in course fees and semester time if they can pass a placement test and avoid developmental math.

V. Conclusions



The EdReady system has attracted interest and enthusiasm from educators, administrators, and policymakers because of its low cost, streamlined design, flexibility, and mission-driven governance model. However, low- or no-cost access is not sufficient to ensure adoption, let alone usage. EdReady has been most successful in states that have local support units in place to build awareness, show educators how the system can address their needs, and facilitate implementation.

Pilots using EdReady in a range of contexts have shown promise. There are many success stories in Montana and Hawaii, and early evidence from 13 local pilots has shown some gains in student outcomes. Yet most of these pilot studies were small in scale and did not account for variations among students or other contextual factors. Thus, it is too early to tell whether these positive findings are generalizable or whether the gains were associated with use of EdReady or other factors. In the coming years, it will be important to conduct rigorous studies to generate more conclusive evidence of EdReady's impact on student outcomes when used in various ways (use models) and in varying contexts.

Appendix

Summary of Pilot Test Evidence

Data about pilot activities in local sites was obtained from the NROC website and from interviews by SRI Education staff of EdReady implementers. Only pilot studies in which measured outcomes were provided, either through written documentation or confirmed verbal report, have been included, although many additional institutions reported qualitative evidence of improvements associated with EdReady use (See Table A-1).

This table presents available data organized by use case and provides a description of the evidence itself and summary of results. EdReady pilot studies and other implementations are mostly happening on a small scale and lack comparison groups. From the institutions' own descriptions of how they used EdReady, it was clear that many of them used it in more than one way and could be categorized under multiple use cases. However, they were included only under a particular use case in the table to simplify the presentation and focus on dominant uses.

Table A-1: EdReady Pilot Study Overview, as of Aug. 2015

Use Case	School/ Institution	Population	Time Frame/ Sample Size	Measured Outcomes or Findings
High School Test Preparation	Waipahu High School Early College, HI	High school students in the early college program	Summer 2014:18 Fall 2014: 80	64% of the 50 students who sat for COMPASS placement exam qualified for college-level math, compared to 41% the previous year. 17 of the 50 students took the placement exam before and after using EdReady. 13 (76%) of them moved up by 1 to 4 class placement levels after using EdReady. Significant improvement over the general population of students from the prior year, when half placed into developmental math.
	Nevada State College, Upward Bound TRIO Program, NV	High school students at academic risk	Summer 2015: 49	39% of students showed improvements in their EdReady score. Of these, 17 students gained 10 or more points.

Table A-1: EdReady Pilot Study Overview, as of Aug. 2015 (Continued)

Use Case	School/ Institution	Population	Time Frame/ Sample Size	Measured Outcomes or Findings
In-School Use by Middle & High School Instructors	LEAP Academy, alternative high school, MN	ESL students	November 2014-March 2015: 36	In one class, 3 out of 14 students who completed the initial diagnostic assessment improved in fractions. The median EdReady score increased by 2 points. In another class, 16 of 22 students improved in geometry. The median EdReady score increased by 4 points.
	AGAPE alternative high school, MN	Pregnant teens/mothers attending the high school	2014-15 School Year: ~100	31 of the 43 students who completed the diagnostic test improved. The median EdReady score increased by 7 points.
	Park City High School, UT	Students in a math classroom	Fall 2013: ~90 invited, 70 active	Approximately 50% reached the target score in less than 10 weeks of use.
	Independence High School (alternative school), UT	Students in a math classroom	Fall 2013: ~91 invited, 62 active	On average, students had a 25% increase in their EdReady scores after only a few hours of studying the materials.
	South Carolina Middle Schools under VirtualSC program	7th, 8th, and 9th grade middle school students enrolled in summer school programs	Summer 2014: 14 schools, 344 students	Average 29 point gain in EdReady score.
Curricular Base for Transitional Bridge or Boot-Camp Programs	Gallatin College, MT	Recent high school graduates enrolled in a postsecondary degree program	Summer 2014: 405 invited, 117 enrolled, 99 logged in	The pass rate of 78% for students who completed at least 90% of the material in EdReady, successfully tested up, and enrolled in a math course was higher than the historic pass rates in M096 (61%) and M121 (56%). 56 students passed the placement test to move up a level in math, and 68% of all students who logged in passed the placement test. The pass rate for students who did not move up a level in math (73%) was also higher than the historic pass rate.
	Owensboro Community and Technical College, KY	Recent high school graduates	May 2014: 11	The majority of recent high school graduates made gains in developmental math after the boot camp. 9 of the 11 students either progressed to a higher level of developmental math or became college and career ready (CCR).
	Montana Digital Academy and the University of Montana, MT	1) Students who have not met the prerequisites the University requires for the math class that is best for their educational goals, but their placement score was close to the required level and they feel they have the dedication. 2) Students met the prerequisites, but it had been a while since they took a math class, or they narrowly accomplished the placement test cutoffs and are now struggling in the class. 3) Students did not enroll in a math course for the fall semester, but they wish to raise their math placement score to get into a higher math course in the spring.	Summer 2013: 72 registered, 63 logged into ER	41 (65%) of the 63 students reached the EdReady target score and were able to take or re-take the math placement exam. Students who reached the target score spent significantly more time studying the resources. 35 (85%) of the students who reached the target score in EdReady raised their math placement score by 1 or more points.

Table A-1: EdReady Pilot Study Overview, as of Aug. 2015 (Continued)

Use Case	School/ Institution	Population	Time Frame/ Sample Size	Measured Outcomes or Findings
	Highlands College, MT	Students enrolled in developmental math courses at the college	Spring 2015 Case 1: 15 in Math 61 and 35 in Math 90. Case 2: 20 in summer Math 90 and 95; 21 in the fall.	Case 1: 70% of Math 61 students enrolled in classes for the upcoming semester; <60% of Math 90 students enrolled in classes for the upcoming semester (for some degree programs Math 090 was the required course, and enrollment in subsequent math courses was not required). These outcomes were better than the norm; normally 40% of students or fewer go on after Math 90. Case 2: 100% completion rate for summer Math 90. Two students completed summer Math 95. 86% (18/21) of students completed fall Math 90, and two finished Math 95 and College Algebra (i.e., completed 2 to 3 developmental courses in one semester). Some students also completed summer Math 90 one week early. Overall, these outcomes indicate more improvement from using EdReady than from using the Pearson product.
Supplement to Postsecondary Developmental Math Course	Jacksonville State University, AL	Students enrolled in developmental math	Fall 2014: 300 Spring 2015: 600	In fall 2014, 52% of total students passed MS100 Intermediate Algebra, and 56% of attenders (those who satisfied the course attendance requirement) passed. In spring 2015, 65% of total students passed MS100, which indicates an increase in passing rate compared to previous spring MS100 cohorts (45% to 55% passing rate). 78% of total MS100 students passed their first college credit math course the next semester, and 86% of attenders passed. In fall 2014, 66% of total students passed MS100 Intermediate Algebra-Accelerated, and 77% of attenders passed. In spring 2015, 59% of total students passed and 81% of attenders passed. 71% of total MS100-Accelerated students passed their first college-credit math course the next semester, and 83% of attenders passed.
	Owensboro Community and Technical College, KY	Students who have attended the college for at least 1 semester and still have not passed the developmental math course. By personal invitation.	December 2014: 11	The majority of students made gains. Eight of the 11 students either skipped over developmental math classes or became CCR. One student went up three tiers.
Use In Postsecondary Credit-Bearing Courses [No pilot studies available]				
Independent Student Use [No pilot studies available]				

SRI Education™

SRI Education, a division of SRI International, is tackling the most complex issues in education to identify trends, understand outcomes, and guide policy and practice. We work with federal and state agencies, school districts, foundations, nonprofit organizations, and businesses to provide research-based solutions to challenges posed by rapid social, technological and economic change. SRI International is a nonprofit research institute whose innovations have created new industries, extraordinary marketplace value, and lasting benefits to society.

Silicon Valley
(SRI International headquarters)
333 Ravenswood Avenue
Menlo Park, CA 94025
+1.650.859.2000
education@sri.com

Washington, D.C.
1100 Wilson Boulevard, Suite 2800
Arlington, VA 22209
+1.703.524.2053

www.sri.com/education

Stay Connected