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This chapter describes strategies for containing and reducing the costs of e-learning through cost identification, appropriate instructional roles, course development, program scale, and course redesign.

Five Important Lessons About the Cost of E-Learning

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Rio Salado College (Arizona), one of the ten Maricopa community colleges, is recognized nationally for its successful distance learning program, which consists primarily of electronically delivered learning (e-learning). This program, which began in 1996 with six thousand students, currently serves twenty-one thousand individuals per year. Rio Salado's e-learning program provides students with high-quality online courses, programs, and services that are conveniently available at an affordable price. The tuition for e-learning courses is the same as for face-to-face courses: $55 per credit hour for in-state students and $135 per credit hour for out-of-state learners. With just under half its total enrollment offered through e-learning, Rio Salado College operates at a cost that is 34 percent below the average of its nine sister colleges. It is able to do so because it has developed and implemented several e-learning cost-containment strategies. This chapter describes five important lessons that Rio Salado College, a participant in the Pew-sponsored Center for Academic Transformation's course redesign project, learned about the cost of e-learning and strategies for containing these costs.

Lesson One: Identify E-Learning Costs

Unlike in a traditional face-to-face class where an instructor is responsible for all tasks related to developing and delivering a course, e-learning involves a variety of resources, all of which have associated costs. Colleges looking for rules of thumb on e-learning costs, or for comparative data from other colleges, should proceed with caution and be aware that e-learning

costs will vary according to institutional goals and approaches. Nonetheless, a formal costing methodology can provide guidance in identifying the costs of e-learning.

The Technology Costing Methodology is one such method. Developed by Dennis Jones through the National Center for Higher Education Management Systems and the Western Cooperative for Educational Telecommunications, it is free to users and available online (http://www.wcet.info/projects/tcm). This methodology was designed to apply to a variety of technology-assisted delivery modes, and helps colleges to identify the activities directly associated with their unique e-learning approaches, as well as the full range of costs associated with those activities.

Another costing methodology, assisted cost calculation (Jones, 2001), focuses on broad areas of organizational structure—instruction, academic support, student services, and institutional support—that are then divided into subcategories. For example, instruction is divided into course design and development, instructional materials, content delivery, tutoring, and assessment.

Jones's methodology includes factors that affect the bottom line, such as costs borne by others, the costs of unused capacity, and the costs of adding capacity (Jones, 2001). This methodology also gives institutions the choice of analyzing costs by course, discipline, or type of delivery. This unit of analysis feature is important because it helps colleges match the cost analysis to their particular e-learning circumstances. For example, colleges with very large e-learning systems containing multiple programs, large numbers of courses, and high enrollments may opt to analyze cost by delivery mode. Colleges offering only limited numbers of programs or courses via e-learning, however, may choose to analyze costs by course. Whatever unit of analysis is selected, the final calculation results in cost per student per credit hour for that unit.

Rio Salado College uses a costing model similar to the Technology Costing Methodology but one that recognizes that e-learning is one of the college's primary missions. Just under half of Rio Salado's total credit enrollments come from the e-learning program's 230 individual courses. These courses feed into twenty-one certificate and twelve degree programs, as well as two postbaccalaureate pathways. To support e-learning, the college provides all requisite student services; enrollment assistance, advising, counseling, and the bookstore are available online and via the phone six days a week while the instructional and technology support help desks, tutoring, and the library are available seven days a week. As well, the college provides a range of services for e-learning faculty, such as course development and production advice and training for adjunct faculty.

Given the large scope of its e-learning program, Rio Salado's costing methodology relates costs to the entire e-learning program instead of to individual courses. Also, because the college's e-learning enrollments are so large, it is not affected by the cost of unused capacity. Rio Salado calculates

direct and indirect costs per full-time enrollment equivalent (FTEE; the total annual credit hours divided by thirty), which is a common measure used in Maricopa's budgeting process. In this methodology, the direct costs of e-learning-associated services, such as course development, are apportioned by the FTEE.

Lesson Two: Explore Ways to Maximize Human Resources

Sally Johnstone and Russell Poulin, who have studied institutions using the Technology Costing Methodology, note that "the most critical variables affecting the cost of using technology in teaching and learning activities all relate to people"—what they do and what they are paid (2002, p. 14). Rio Salado College, designed at its inception to deliver instruction primarily with adjunct faculty, exemplifies Johnstone and Poulin's finding on human resource costs. Today the college's e-learning instructional staff includes over four hundred adjunct faculty members and twenty-seven full-time faculty chairs.

How does this affect the bottom line? Higher-paid, full-time faculty chairs with tremendous experience in e-learning pedagogy and instructional design develop Rio Salado's online courses, while adjunct faculty members do most of the teaching. Full-time faculty chairs orient adjunct faculty to the already developed courses, and also train, mentor, and evaluate the adjunct faculty. They establish e-learning policies such as expectations for faculty communication responsiveness. The guidance and support of faculty chairs, as well as the use of previously developed courses, ensure that adjunct faculty members provide high-quality instruction. Because the cost of a three-credit course taught by an adjunct faculty member is 69 percent less than if it is taught by a full-time professor, Rio Salado is able to provide quality instruction while minimizing human resource costs.

In addition, the college has structured its resources to ensure that the adjunct faculty members' time is spent on teaching and learning activities, rather than on nonteaching tasks such as developing courses, answering technology questions, or orienting students to the college's e-learning system. For example, the college has provided two help desks that students can contact for assistance. Students with technology problems are encouraged to call or e-mail the technology help desk rather than the instructor, and students who have questions about course logistics, such as flexibility with assignment dates or test times, are encouraged to call the instructional support help desk to get assistance from adjunct faculty who are trained to answer such questions. Also, Rio Salado's faculty chairs serve as mentors to all online adjunct faculty, which ensures that the adjuncts know how to take advantage of the college's many support services. With this type of support for Rio Salado's adjunct faculty, the college can in good conscience

require enrollment loads of twenty-five to thirty-five students per faculty member, depending on the complexity of the course. This level of enrollment in e-learning courses also helps contain costs.

Lesson Three: Implement Policies to Help Contain Course Development and Production Costs

According to a national survey on distance education at degree-granting postsecondary institutions, the cost of course development is the number one factor that prevents an institution from starting or expanding distance education course offerings (U.S. Department of Education, 2003). Unlike a face-to-face course, which the instructor designs alone, developing an e-learning course can mean involving programmers, Web technicians, graphic artists, instructional designers, content specialists, editors, course testers, copyright usage checkers, and others. It is no wonder that Johnstone and Poulin (2002) warn, "If we are going to have really good electronically mediated courses, then we need to accept the high costs of designing and developing them" (p. 18). With this in mind, colleges need some strategies to contain or justify the costs of developing electronic courses.

In order to maximize Rio Salado College's investment in courses delivered over the Web, the college's policy is to develop one master course that is taught by numerous faculty members over a three-year period. This approach to course development has both fiscal and instructional advantages. From a fiscal perspective, the college can amortize the course development and production costs over thousands of students who enroll during the lifetime of the course. From an instructional perspective, the college can afford to invest significantly in the development of one excellent master course. If, in contrast, a college supports the development of numerous versions of the same course, the cost will escalate and the college's ability to invest in course development will diminish. For example, in order to serve 3,600 students over a three-year period, a college might spend $2,000 in development costs for each of seventeen versions of Psychology 101 (225 students per version). Although it spends a total of $34,000, it is investing only $2,000 in each course. In contrast, the same 3,600 students could be served over a three-year period with one version of Psychology 101. In this case, because the college develops only one course, it can use up to $34,000 to create a high-quality course that can be delivered as many times as needed over the three years.

Lesson Four: Consider Scale and Scalability

The scale of an e-learning program is measured by the sheer number of students enrolled in it. Scalability, in contrast, refers to an organization's capacity to adequately serve large and increasing numbers of e-learning students. Large-scale enrollments drive down fixed costs. Kevin Kruse (2002–2004)

correctly portrays scale as a significant element in determining initial course development costs and makes the point that "the cost is the same regardless of whether there will be ten students or a thousand" (p. 8). Enrollment scalability is also an important consideration in the development of support services for e-learning. That is, colleges that have or are anticipating large enrollments can justify implementing a full range of services, whereas colleges with small enrollments may need to find more cost-effective methods.

Rio Salado College's e-learning program was designed for large-scale enrollments and a scalable support system. In 1995, Rio Salado chose to make distance learning a primary focus of its mission. Among the first actions associated with this change were the dismantling of its small ancillary distance learning department—which functioned in isolation—and the creation of a collegewide system to support distance learning, primarily e-learning. Today, visitors to Rio Salado College are often surprised to find there is no distance learning department. Instead, they find course development, production and support, information services, faculty hiring services, an instructional support help desk that includes online tutoring, a technology support help desk, and student enrollment services, all supporting Rio's e-learning faculty and students online or over the phone. Because the e-learning program was designed in anticipation of growth, Rio Salado College has a system of services scaled to meet the needs of its growing body of students. Colleges with small numbers of e-learning enrollments can avoid the costs of expensive infrastructure and services by participating in e-learning consortia that provide such services or by outsourcing course development or other services such as a technology help desk.

Lesson Five: Redesign Large-Enrollment Courses to Reduce Cost and Improve Learning

In 1999, Rio Salado College was selected to participate in the Center for Academic Transformation's course redesign project, funded by the Pew Charitable Trusts ("Pew Learning and Technology Program," 2002). This program, spearheaded by Carol Twigg, funded a variety of colleges and universities to prove that the use of technology in higher education could not only increase access and reduce costs but also improve learning. Over a three-year period, thirty institutions explored ways to redesign large-enrollment courses to accomplish these goals. In addition to redesigning a large course, each participating college had to compare its costs and learning outcomes to the same course provided in a traditional format. Of the thirty course redesign projects, five—including Rio Salado's—were fully online.

The Pew redesign project required that each institution focus on improving student learning, make detailed financial plans, and meet basic readiness criteria (Twigg, 1999). Each college had to demonstrate it was ready to participate in course redesign from both institutional and instructional

perspectives. Institutional readiness criteria required proof of the organization's desire to reduce or control costs, an adequate information technology infrastructure, and a commitment to learner-centered education. Likewise, the instructional readiness criteria necessitated providing evidence of a substantial number of faculty members with experience in computer-based instruction, a willingness to experiment, courses with the potential for "capital-for-labor substitution," and a plan to "support the ongoing operation of the redesigned course" (Twigg, 1999, pp. 9–10).

Having met most of the instructional readiness criteria, Rio Salado College decided to redesign its Internet-delivered introductory algebra course, a prerequisite for students needing to complete college algebra, and third on the Maricopa list of the top twenty-five largest enrollment courses. At the time, Rio Salado College was using Academic Systems, a CD-ROM technology, to deliver its pre-algebra and college algebra courses over the Internet. This software presented interactive course content including customized homework assignments related to individual student performance. It also provided the faculty member with information about each student's progress, and tracked each student's time on task. Prior to the course redesign project, Rio Salado's online math courses using Academic Systems software were staffed and supported in the same way as other online courses; one instructor was responsible for thirty-five students.

In exploring ways in which introductory algebra could be redesigned, Rio Salado's math faculty chair and several adjunct faculty members—all experts in the use of Academic Systems—made several observations that influenced the planning of a new course delivery model. First, they agreed that they were not making full use of Academic Systems' student progress data. They felt that if they used the tracking data to communicate more often with students at critical junctures in the course, they could increase the course completion rate (which was then at 59 percent). Second, they noted that the instructional design and content of the Academic Systems math software worked well for most students, and that students relied on the instructors mainly to answer questions about course logistics, such as when to take tests. Thus, they decided it was possible to increase the number of students in the online Academic Systems class, and they committed to a redesign goal of increasing the number of students in a course from thirty-five to one hundred, while also increasing the course completion rate.

However, Rio Salado's twenty-six enrollment periods caused enrollments to be spread out over a semester, which made it impossible to provide one instructor with one hundred students at one time. Yet because Academic Systems also provided the content for three other courses—mathematical concepts and applications, intermediate algebra, and college algebra functions—these courses were added to the project. As a result, Rio Salado piloted a model in which one instructor used Academic Systems software to instruct one hundred students enrolled in any of these four math courses. A course assistant, a junior-level math major, was added to

the course redesign in order to increase proactive communication with students. Using Academic Systems' built-in course management system, the course assistant monitored student progress and alerted the instructor to student difficulties with the material, thus helping the instructor take timely action with students who were lagging behind.

By using technology to its full capacity, increasing class size, offloading course management tasks to a course assistant, and devoting faculty time to four different but concurrent courses, Rio Salado realized a cost-per-student reduction of 37 percent (from $49 to $31 per student) compared with previous distance learning formats at the college. Overall, the course completion rate for the students in the redesigned course was 64.8 percent—a 5.8 percent increase from the previous standard. Rio Salado's success in increasing completion rates while tripling the number of students illustrates the potential of course redesign.

The redesigned course format of one hundred students per instructional assistance team was piloted with three different adjunct faculty members. Although it worked, and all three instructors had similar student completion rates, one faculty member did not feel comfortable working with the assistant and instead tended to answer questions and deal with issues that could have been delegated. As a result, this instructor became overwhelmed by one hundred students. Recognizing that there is variability among adjunct faculty members' ability to use the course management system and to adapt to one hundred students and an assistant, the college has since reduced the enrollment per faculty member to fifty, still saving nearly 19 percent over traditional e-learning courses.

Rio Salado College gained much from its Pew redesign experience. Interestingly, in retrospect the college's most valuable lesson was its realization that it too was vulnerable to the more costly approach of adding technology without changing the design of the course. Without the impetus of the Pew experience, the college might still be using Academic Systems software in a traditional course format with only thirty-five students per instructor.

Conclusion

Colleges seeking to contain or reduce the costs of e-learning programs will benefit from taking the time to carefully plan a strategy that is in alignment with their goals and program scope. That strategy begins with determining readiness for such an endeavor, and then using a technology costing methodology to determine its true costs. It goes on to explore cost-effective instructional roles and ways to contain the cost of online course development. A cost-containment strategy requires institutions to come to terms with the realities of scale. It may also necessitate redesigning the traditional course format in order to take full advantage of cost savings associated with technology. Ideally, institutions will develop a strategy that reduces cost while also improving learning.

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