

The Online Academy: An Extranet Approach to Virtual Implementation

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Abstract

The Online Academy (HO29K73002) was funded by the Office of Special Education Programs (OSEP) to develop online instructional modules in the content areas of reading, positive behavior support and technology across the curriculum. Targeted for preservice teacher education programs in Institutions of Higher Education (IHEs), the modules have been implemented by over 172 institutions. This paper addresses the effectiveness of the implementation model and the formative evaluation processes employed by the Academy in readiness for implementing the modules nationally and the results of that effort.

## Background

The Office of Special Education Programs (OSEP) funded the Online Academy as a three-year project in 1997 to develop online instruction for preservice programs in teacher education. The content areas were reading, technology across the curriculum, and positive behavior supports with an emphasis on research to practice. A design tool and production process were created to automate the generation of online modules once content had been prepared according to prescribed specifications. As a result, twenty-two modules were developed, evaluated, and disseminated through the implementation model that will be described in this article. The modules were content-rich, interactive, utilized streaming media and were designed to be offered fully online. Each module included over 2000 text files and 500 graphic files and required approximately 12-14 clock hours of engaged instruction in order to be completed.

While use of the Academy modules by university-based teacher education programs nationally was the ultimate goal of the Online Academy, many institutions of higher education (IHEs) did not possess the needed technology infrastructure when the modules were first released. This added to the implementation challenge. Thus, in order to maximize implementation, the processes that were targeted for implementation were integrated into the project from the beginning. For example, early in conceptualizing the Academy model, two critical decisions were made that greatly impacted implementation. First, it was decided that implementation would be based on an extranet model. This involved designing the technologies for delivering the modules so that all modules could be downloaded locally and delivered from the participating institutions' server. Second, it was decided that the online technology to be developed must be scalable nationally and not dependent on advanced technologies that might

only be available at some institutions. While adding to the complexity of the design and development tasks, these two decisions enhanced the probability of successful implementation.

For the Academy, implementation represented the culmination of all activities that took place in the design, development, production, and testing of the e-learning modules. Formative procedures were employed to ensure that the content and design were conducive to maximizing implementation. Specifically, prior to implementation, the modules were subjected to extensive evaluation carried out in five stages (Meyen, 2001). Two stages of Alpha testing occurred in-house in a highly focused process. The emphasis in stage one was to assess the effectiveness of the user interface design. In the second stage of alpha testing, emphasis was on assessing how the modules might be managed when offered to groups of students. To that end, the Academy enrolled teacher candidates from two states under conditions similar to how they might ultimately be enrolled during implementation. The students completed a module and earned credit for their work. Data were collected on their performance, navigation preference and problems encountered.

In addition to the two stages of Alpha testing, Beta testing was carried out with 32 IHEs over a period of more than two years. While Alpha testing focused largely on user interface and design features, the Beta testing addressed content as well as user concerns (Meyen, Aust, Bui, Ramp, & Smith, 2002). The first version of the module design was used in the Beta test. Two elements of the Beta testing included the evaluation of module design features by users and an evaluation of lesson elements. Table 1 contains data on the evaluation of design features. These data were collected in 1999 at which time few students or instructors had experience with online instruction.

Table 1

*Students' Mean Rank Scores for Evaluation of Modules*


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Statement	Mean
Controlling audio player	1.9
Easy access to features	3.4
Effective glossary	3.8
Module review features	3.6
Quality of screen design	3.9
Usefulness of screen design	3.7
Response time of features	3.5

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Note. Student rank scores applied on a five-point scale with five being the most positive score and one the most negative score (N=32).

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As indicated in Table 1, students gave the lowest rating for the audio player. However, through follow-up contacts, we learned that most students did not have an audio player, and the low rating was due to their lack of experience in using audio players. These students also reported that they opted for the text version of the modules as the content was the same as the multi-media presentation. The evaluation of lessons reported in Table 2 illustrates the students' failure to use the audio player at that time. This has changed dramatically in practice as students

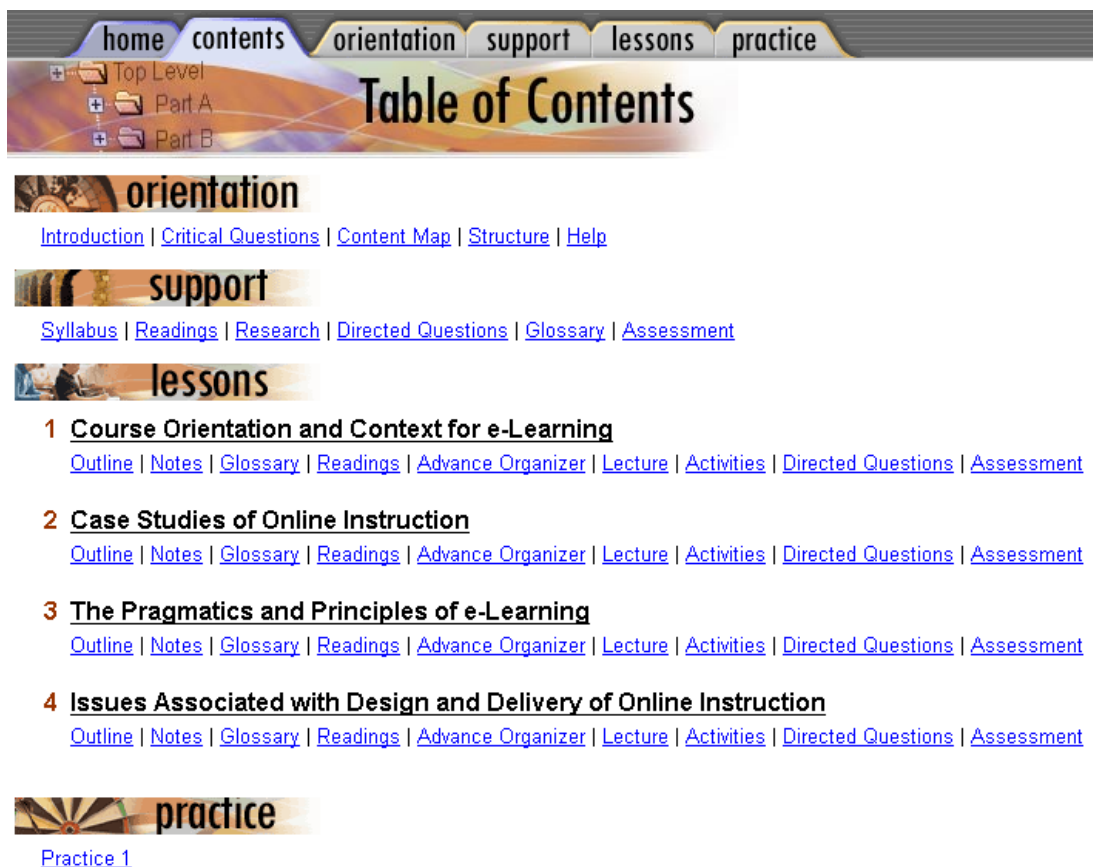
have gained experience with Real Player and online instruction in their daily lives. Another example of how quickly technology has influenced education is the students' response to the question "Does technology help learning?" Again, students in the Beta test had no prior experience with online instruction. As a result, the students' response at that time was not conclusive (see Table 2). Beta tests on modules more recently developed by the Academy clearly substantiate the perceived value of online instruction.

Table 2 *Summary of Student Evaluation of Lessons*

Question	Response	
	Yes	No
Did you use an audio player?	21	120
Were the instructional goals clear?	141	0
Does technology help learning?	71	70
Were the instructions clear?	125	16
Did the layout help?	103	38
Were the lessons appropriately integrated	35	6
Were the lessons interactive and engaging?	103	38

Note. N= 141.

Formal evaluation procedures were also applied in evaluating the tool design and production process (Meyen et al., 2002). The goal in creating the instrument design for the modules was to integrate features that were common to effective face-to-face and online instruction. At the same time, attention was given to integrating those technological features that enhance online instruction. Figure 1 illustrates the table of contents (TOC) of the module design. While several navigation options were designed into the modules, every feature of a module can be accessed from the TOC. As noted in Figure 1 there are four levels to each module. Most of the content and interaction were built into the Lesson Level. Modules can be viewed online at <http://onlineacademy.org>



Section	Sub-sections
orientation	<a href="#">Introduction</a>   <a href="#">Critical Questions</a>   <a href="#">Content Map</a>   <a href="#">Structure</a>   <a href="#">Help</a>
support	<a href="#">Syllabus</a>   <a href="#">Readings</a>   <a href="#">Research</a>   <a href="#">Directed Questions</a>   <a href="#">Glossary</a>   <a href="#">Assessment</a>
lessons	<ol style="list-style-type: none"> <li><b>1 Course Orientation and Context for e-Learning</b> <a href="#">Outline</a>   <a href="#">Notes</a>   <a href="#">Glossary</a>   <a href="#">Readings</a>   <a href="#">Advance Organizer</a>   <a href="#">Lecture</a>   <a href="#">Activities</a>   <a href="#">Directed Questions</a>   <a href="#">Assessment</a></li> <li><b>2 Case Studies of Online Instruction</b> <a href="#">Outline</a>   <a href="#">Notes</a>   <a href="#">Glossary</a>   <a href="#">Readings</a>   <a href="#">Advance Organizer</a>   <a href="#">Lecture</a>   <a href="#">Activities</a>   <a href="#">Directed Questions</a>   <a href="#">Assessment</a></li> <li><b>3 The Pragmatics and Principles of e-Learning</b> <a href="#">Outline</a>   <a href="#">Notes</a>   <a href="#">Glossary</a>   <a href="#">Readings</a>   <a href="#">Advance Organizer</a>   <a href="#">Lecture</a>   <a href="#">Activities</a>   <a href="#">Directed Questions</a>   <a href="#">Assessment</a></li> <li><b>4 Issues Associated with Design and Delivery of Online Instruction</b> <a href="#">Outline</a>   <a href="#">Notes</a>   <a href="#">Glossary</a>   <a href="#">Readings</a>   <a href="#">Advance Organizer</a>   <a href="#">Lecture</a>   <a href="#">Activities</a>   <a href="#">Directed Questions</a>   <a href="#">Assessment</a></li> </ol>
practice	<a href="#">Practice 1</a>

Figure 1. Table of Contents

Prior to full implementation, a controlled implementation phase followed the second Beta test. The intent of the controlled implementation phase was to test the installation process via the extranet model and to determine how long it would take IHEs who adopted the modules to download and install them on their servers. The controlled implementation phase, involving seven IHEs, revealed that the time required for downloading and installation was excessive. This was due to the streaming media features of the modules. Thus, after making additional programming changes to accommodate the streaming media features of the modules, the time required to install a module locally was reduced from a minimum of three hours each to 20 minutes per module. The controlled implementation phase became the third Beta test.

A decision was made very early in the project not to use traditional forms of dissemination in the implementation of the modules, but rather to employ a model that was more compatible with online instruction. It was decided that flexibility, access, revision and immediacy of posting for use should characterize the implementation of the Academy online modules. However, in 1996 when the Academy was originally funded, there was almost no literature on how to achieve this because online instruction was just emerging. Universities were still debating the efficacy of online pedagogy, and there was no comparable project of similar scope to the Academy to collaborate with in designing a national online implementation model. Technologies in place today were on the horizon, but they were not stable enough for the magnitude of implementation the Academy would ultimately engage in. Since the Online Academy was a three-year project with no assurance of continuation, utilizing resources of the project for sustained implementation or technical support on a continuum was not an option.

Based on announcements from industry about emerging technologies, the Academy committed to an extranet model very early. This was decided because if successful, distribution



would be immediate. Participating institutions would be able to install the modules on their own servers and manage their use. As beta testing of the modules progressed, projects employing online distribution systems began to be reported in the literature. Some were related to K-12 schools (Visscher, Wild, & Alex, 1999) and while not directly applicable, they nevertheless provided useful information. Cohen and Hickman (1998), in reporting on large-scale implementation programs in science and math, emphasized the importance of matching the curriculum with district needs. Since OSEP had already ascertained the need for the three content areas being addressed by the Online Academy, it was assumed that they matched the needs of teacher education programs nationally. Additionally, Bronack and Riedl (1998) listed the conditions necessary for implementation in the context of pedagogy and various attributes of media technologies. Thus, during the history of the Academy, sources began to appear in the literature that addressed the capacity of the extranet model and its application to schools and universities (Littman, 1998; Preston & McCrohan, 1998).

### Methodology

Implementation was built on a formative approach to assess and modify the design, development, production and testing procedures for the modules. The intent of this approach was to integrate into each process what was learned from the evaluation of other processes in order to improve the product (i.e., the modules) and to enhance their implementation or distribution (Meyen, 2001).

Implementation took two forms following the Alpha and Beta testing. First, controlled implementation involved testing under normal implementation conditions. The intent was to identify and correct any problems associated with the installation of modules on the server of

implementation sites. Second, full implementation consisted of the release of Academy modules for use by participating institutions. This involved operationalizing the extranet model on implementation sites with minimal technical support from the Academy. This process allowed instructors from participating institutions to access the Academy website and download the modules for installation on their campus servers. See Table 3 for the timetable and descriptive elements of alpha testing, beta testing, controlled implementation and full implementation.

Table 3

### **Evaluation and Controlled Implementation Timetable**

Type of Testing	Timeline
Alpha Testing: Stage 1	Began ten months into project after prototype of tool completed. Repeated periodically as modules were completed. This was an observation process focusing on performance of individual students.
Alpha Testing: Stage 2	Subjects included forty individuals from two states. Subjects were enrolled and each tested a module under prescribed conditions. Lasted four months and occurred in year 2 of the project.
Beta Testing	Thirty-two institutions of higher education participated in beta testing. Feedback was obtained on student performance and their evaluation of the modules features. Instructor feedback was also obtained. Most students and instructors had no previous experience with online instruction. Beta testing lasted six months.
Controlled Implementation	Seven institutions were selected to use the modules under the same conditions prescribed for final implementation. Each instructor had some experience with online instruction. This occurred approximately six months

following completion of Beta testing. It lasted for approximately six months across two semesters and occurred in the third year of the project.

#### Full Implementation

All AACTE member institutions and others who had expressed an interest in the Academy modules were invited to participate in implementation. While the modules were made available without charge, each institution signed an agreement to provide the technical support and a faculty contact person. This occurred during the last two months of the three-year project. One hundred and seventy two institutions have installed the modules.

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#### *Controlled Implementation*

Recommended by OSEP, the controlled implementation stage was to be carried out with seven technology-enhanced institutions using faculty and staff who were technology-competent and highly motivated to use the modules. During controlled implementation the Academy wanted to monitor access and technology problems associated with the use of the modules. In Beta tests 1 and 2, participating faculty and students were largely inexperienced in online instruction. Therefore, it was important during the controlled implementation to submit the modules to use by faculty who had some experience with online instruction. Since the extranet model was the only part of the module design that was not tested during Beta tests 1 and 2, it was essential that any problems in the procedure be resolved before full implementation began.

The controlled implementation was important for another reason. Once Beta tests 1 and 2 were completed and the modules were deemed stable, the goal was to move all modules and technology to servers located at, and maintained by, the individual preservice programs wishing to implement them through the extranet model.

Controlled implementation testing began with the identification of colleagues who were engaged in online instruction and were willing to participate. Attention then shifted to

institutions that were known to have the technological capabilities as well as an interest in working with the Academy in this final testing phase. This search included Beta 1 test sites that had been especially helpful in providing evaluation feedback on the modules.

Approximately 20 sites were considered for controlled implementation. After initial contacts and discussions, the list was narrowed to 10 possible institutions. Following further discussions about course conflicts, department requirements, and several other matters, seven institutions were selected to participate. Most of the institutions were familiar with, and some had used Academy modules, and one was a former Beta 1 test site. Detailed instructions were developed for these sites including developing and making available online special Help files, FAQs, and a Getting Started Tutorial. Special help lines for both phone and email communications were also set up. The entire controlled implementation process lasted approximately two semesters. The goal was to take one last, hard look at the modules and their use by universities before beginning full implementation. It was especially important that the extranet downloading process go flawlessly for those institutions opting to implement the modules.

### *Full Implementation*

Full implementation occurred as soon as the controlled implementation evaluation process was completed, and the modules were in final form and considered stable. As previously mentioned, a decision of the Online Academy was made to employ the extranet model. The extranet model was made necessary by two factors. First, the Academy wanted to achieve the greatest dissemination possible, and it was felt that other institutions might want to brand the modules with their own names and course information. The extranet model would provide a greater sense of ownership for the institution than a model requiring use of modules from

Academy servers. Second, the Academy had a limited lifespan—governed by a three-year federal grant—and could not provide any assurance of continued support after the grant ended. Therefore, once implementation started, all responsibility and control for maintaining and distributing the modules would have to reside with participating institutions, not the Online Academy. Although the extranet model added complexity to the design and distribution process, it was hoped that it would be seen as an asset and contribute to the wider distribution of the modules.

One requirement for implementation via the extranet model was that each host institution would have to meet certain technical requirements that were necessary to download and utilize the modules. For example, each institution had to enter into a formal implementation agreement, which had to be signed by the dean or program director, attesting to the institution's commitment to installing and using the modules as prescribed. Additionally, a faculty member and a technology systems administrator were required to be named at the host institution. The institution also had to provide the necessary server hardware and software to run the modules locally and the technical assistance and support needed to install and maintain the modules on an institution-based server. Specific requirements included a functioning Web server of any type with at least 50 MB of free storage space per module and a functioning Real Networks G2 server with at least 20 MB of free space per module. Furthermore, a system administrator with Web server and G2 skills had to be identified along with a technical support person with whom instructors and students could work with after classes began.

The final implementation process involved notifying national preservice education programs of the availability of Online Academy e-learning modules and the process they should go through to obtain them. To accomplish this, the Academy first produced a packet of

information materials describing all the modules and their content, technical and system requirements for module setup, and various other features of online instruction. The packets, along with a cover letter, were mailed to the deans, directors and department heads of 750 teacher education programs that constituted the membership of the American Association of Colleges of Teacher Education (AACTE).

The cover letter notified institutions that the modules were available at no cost and explained how they could obtain them within a specified deadline by submitting a formal agreement. The packet also consisted of an agreement form, which included details about how to download the modules and the institution's responsibility for maintaining and supporting the modules once installed on local servers. Specifically, participating institutions were required to register with the Academy to use the modules. They were also required to meet the following conditions for implementation and to accommodate specific implementation requirements.

#### *Conditions of Implementation*

1. The modules or lessons may be offered as independent courses or integrated into regularly offered courses in the preservice teacher education program.
2. The tuition pricing policies of the institution shall apply in the offering of the modules.
3. The modules shall not be offered for continuing education credit. (The Academy reserved this option.)
4. The institution may add its name and course identification to the modules in order to meet its enrollment needs; however, the OSEP and Academy identification credits for the development and design of the modules must remain as embedded in the modules.
5. No modifications shall be permitted to the content of the module. The modules, however, maybe used in total or in part.

6. The Online Academy and the University of Kansas expressly disclaim any and all express or implied warranties and make no express or implied warranties or representations of any kind including but not limited to warranties of merchantability, of fitness for a particular purpose, and that the use of the Academy modules will not infringe on any patent, copyright, trademark or other rights. Further, the Online Academy and the University of Kansas make no representations whatsoever that the Academy modules are free from liability for patent infringement or may be used without infringing any other patent, except to the limited extent that the Online Academy and the University of Kansas represent that, as of the effective date of this agreement, neither the Online Academy nor the University of Kansas has actual knowledge that the Academy modules infringe any valid and enforceable patent held by a third party.

*Institutional Requirements for Implementation*

1. Adherence to the above “conditions for implementation.”
2. Designate a faculty member and a technical support person as the contact people during the installation process.
3. Provide the technical assistance and server support needed to install and maintain the modules on an institution-based server. The Online Academy is not responsible for any installation, maintenance, or troubleshooting that may be required for installation and operation. A functioning Web server of any type is recommended with at least 50 MB of free storage space per module and a functioning Real Networks G2 server with at least 20 MB of free space per module.
4. Identify a system administrator with Web server and G2 skills, as well as a technical support person with whom instructors and students will work with. (See No. 4 above.)

5. Require instructors to complete the instructor's module prior to teaching the modules.
6. Agree to make general technical assistance available to students as needed.

When the installation process began for implementation in the 2001 school year in May of 2000, the Online Academy set up a series of conference calls designed to answer questions and respond to needs for technical assistance during the installation process. A follow-up mailing to the same 750 institutions was made one month later in an effort to secure wider participation.

### Results

The controlled implementation process revealed that initially, system administrators at extranet sites had difficulty readdressing the links to the audio content of modules to be delivered. Due to the streaming media feature, there were a number of links that had to be changed. The coding of the Online Academy modules was also complex and added to the time requirement. In addition, some system administrators experienced difficulty properly configuring their Real Server. To resolve this problem, additional help resources were created, including several procedural guides about Real Server and installation of Online Academy modules. Further, the Online Academy modules were reengineered to change the way that audio resource was readdressed. This resulted in a significant decrease in the time and effort that system administrators had to expend to make the audio resources work from servers under their control. Improvements to the download system were also implemented to allow for better personalization and performance. Following many weeks of testing and retesting of module download and setup designs, a successful combination of enriched help files and a simplified module design produced the desired results.



As of July 1, 2002, 172 institutions had signed the implementation agreement forms requesting to use the modules. Ten additional institutions have installed the modules since the first invitation was extended. Of the initial 162 institutions submitting agreements, 88 downloaded some of the modules to their own servers within a semester. Downloading occurs as modules are used for the first time. Figure 2 shows the geographic location of the 162 sites that have signed agreements for the online modules.

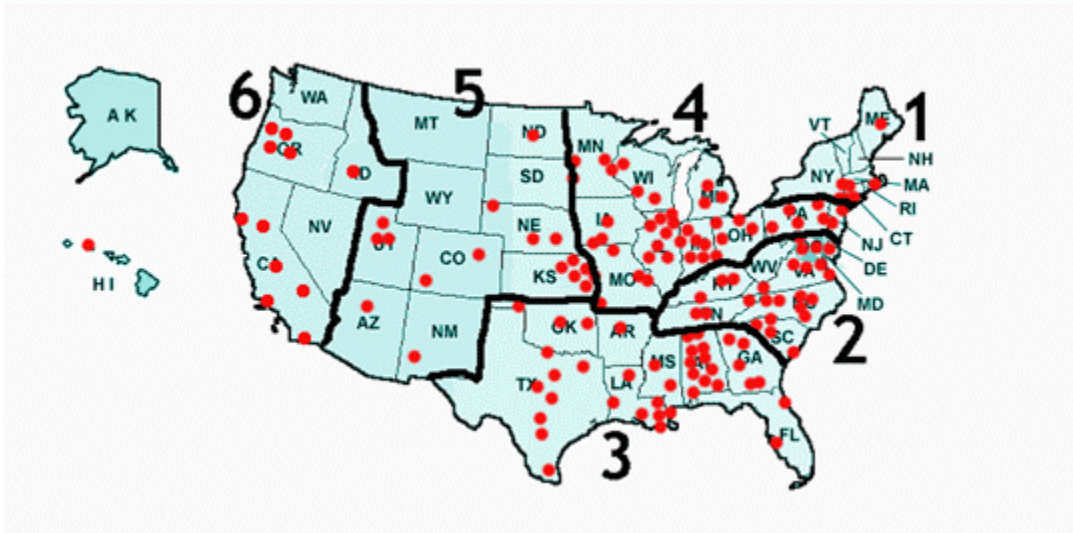
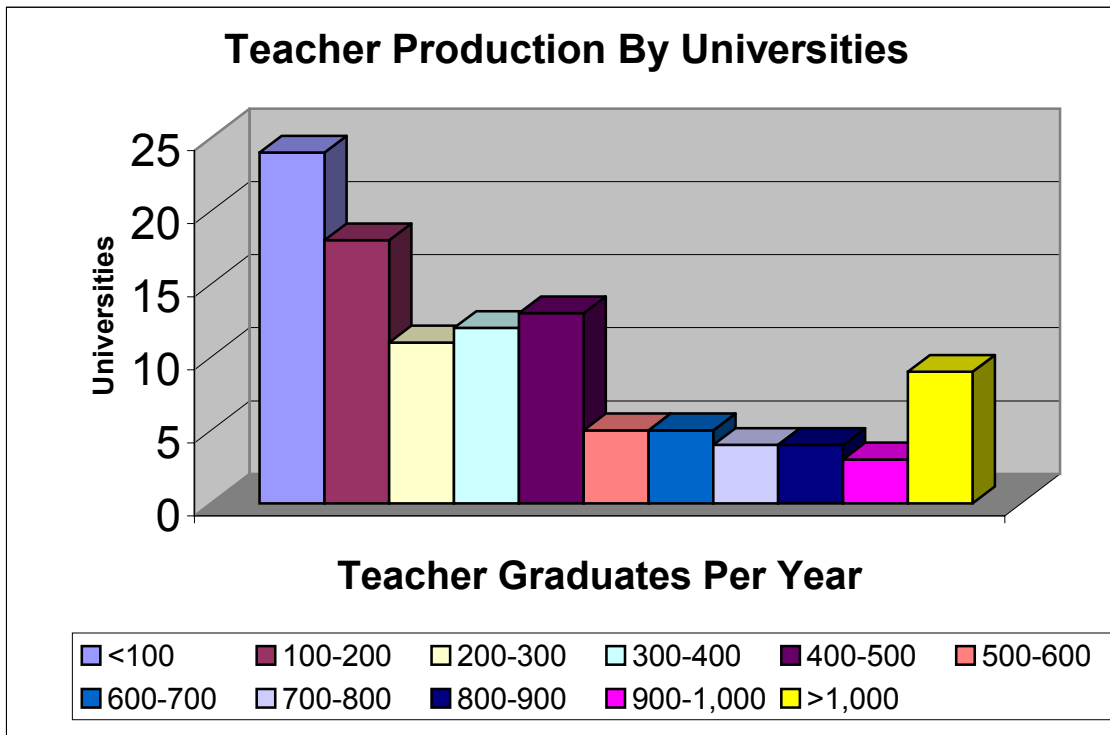


Figure 2. Implementation sites

One important consideration regarding the success of implementation has to do with the types of institutions that have signed agreements to use Academy modules. Since the size of impact is, to some extent, related to the number of teachers a university graduates each year, data on the size of institutions are presented in Figure 3. Of the initial 162 institutions that submitted signed agreements, 24 graduate fewer than 100 teachers per year, 18 graduate fewer than 200 teachers per year, 11 graduate up to 300 teachers per year, and nine institutions graduate over 1,000 teachers per year. (Note: The numbers of institutions reported in Figure 3 do not total 162 because no data were available for some institutions.) For institutions with graduation rates above 1,000, three graduated fewer than 1,100, four graduated less than 1,200 and two graduated between 1,400 and 1,500 students per year.



*Figure 3.* Teacher Production by Universities

As illustrated in Figure 3, the numbers of institutions are skewed toward smaller schools and departments of education. However, the number of graduates annually by the initial group of participating institutions was approximately 17,000.

#### Summary of Lessons Learned

1. The controlled implementation process proved valuable in uncovering problems related to the installation process via the extranet model. Since this was a new process, it was difficult to anticipate the problems that might be encountered at institutions nationally in an online implementation process. Although the modules themselves were known to be stable and

effective, the downloading process required for the extranet mode of implementation had not been tested.

2. National Beta testing may contribute to interest in implementation. The very process of Beta testing in numerous universities nationwide may have generated interest in using the modules by some institutions that had not otherwise expressed an interest.
3. Knowing that the modules had been thoroughly tested probably also contributed to the level of interest when it came time to implement the modules nationally.
4. It became apparent early that online instruction was a topic of major interest to deans and directors in schools of education nationally--both in terms of technology and the content. What began as an interest in new technology may have increased due to the richness of the module content.
5. The level of readiness for carrying out the extranet process of implementation, although not directly related to the size of institutions, varies greatly across the nation. In some cases small institutions in rural settings had very advanced technology capabilities, whereas large metropolitan institutions needed much more technical support from the Online Academy.
6. The extranet model has merit in national online dissemination. Allowing institutions the independence of installing the modules on their own servers appears to encourage ownership and use. The extranet model also offers the advantage of eliminating dependence on a central source for future use.
7. Direct contact with faculty enhances implementation. That is, while communication with deans and/or directors is important in the adoption stage, direct and frequent communication with the faculty member who will be using the modules in instruction contributes to use.

8. Engaging the technical support staff at the institutional level facilitates installation at the institution level. Although some faculty members are fully capable of downloading and installing modules on a local server, when the online instruction being installed involves streaming media, technical skills beyond those typically possessed by faculty are required.
9. The installation process must be efficient and convenient. When institutions are installing the online instruction, their faculty may not have had an opportunity to experiment with the instruction and, therefore, are not likely to have a full appreciation of the value of the resources. If the installation process is time-consuming or unnecessarily complicated, they may not persevere. Also, technicians may form opinions about the quality of the instruction based on their perceptions of the effectiveness of the installation process.
10. When inviting institutions to participate in a project as comprehensive as the Online Academy, it is difficult to ensure that the invitations are received by the targeted person and that it is given the consideration warranted. First-class mail was used in all communications announcing the availability of the modules to deans and directors. They were encouraged to involve faculty in the decision to participate. While having 162 institutions sign implementation agreements was considered successful, 12 responses were received indicating that at this time they were not in a position to participate. Faculty also later informed the Academy that they did not think their dean had received the invitation materials. Given the positive responses from 162 out of 750 packets sent to deans and directors, it is not known whether: (a) the nonresponses represent negative decisions, (b) the packets were not received by the appropriate person, (c) the packets were received but failed to receive the needed attention, or (d) the modules were not valued because of the online format.

11. Careful attention to detail when providing information online appears to reduce the need for technical assistance in the installation process. Once the installation process was refined, detailed information was posted and opportunities for conference calls to offer technical assistance were announced. Names of support personnel were also distributed. Of the 88 installations during the first semester following the announcement of the implementation process, none of the institutions requested technical assistance or the need to participate in conference calls about the process.
12. Establishing requirements for implementation appear to facilitate adoptions. Prior to being approved for implementation, institutions were required to comply with specified requirements and to sign an agreement form. This included designating a faculty contact, naming a technical staff support person and ensuring that the technical capacity to accommodate the modules would be provided. We believe that this process contributed to the large number of implementation sites.

Although the implementation process is complete and the Online Academy no longer exists as a funded project, the e-learning Design Lab (eDL) continues to respond to universities requesting an opportunity to implement the modules. These requests are accommodated (See the eDL web site at [www.elearndesign.org](http://www.elearndesign.org)).

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