DOCUMENT RESUME

ED 473 874 JC 030 143

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TITLE	Ethnographic Study: @ONE Technology Training Project Study.
INSTITUTION	RP Group of California Community Colleges, Santa Ana.
PUB DATE	2002-07-00
NOTE	30p.
PUB TYPE	Reports - Research (143)
EDRS PRICE	EDRS Price MF01/PC02 Plus Postage.
DESCRIPTORS	*College Faculty; Community Colleges; *Computer Uses in Education; *Curriculum Development; *Educational Technology; Internet; Technological Advancement; *Technology Integration; Two Year Colleges; World Wide Web
IDENTIFIERS	*California

ABSTRACT

This report presents findings from an ethnographic study of technology integration and diffusion in two California community colleges. The study was commissioned to examine whether faculty behavior and student learning outcomes have changed as a result of @ONE instructional technology training and resources. The California Community Colleges Chancellor's Office funded the @ONE project for a 5-year period to assess faculty training needs, build a statewide training infrastructure, and develop and deliver instructional technology training. The findings of this study (the first of three parts) were generated through site visits conducted in May 2002 to Santa Monica College (SMC) and Fresno City College (FCC) by researchers from the Center for Student Success. In comparing the level and pace of technology integration at SMC and FCC, the research team found a contrasting pattern of development. While SMC has enjoyed steady growth since 1985, FCC's path to technology integration was truncated until the late 1990s. The report makes recommendations, based on the site visits, including (1) a faculty-driven initiative to identify what technology can do for student learning, by discipline and program; (2) a comprehensive cyclical planning process with a written, flexible technology plan; and (3) local training and faculty development activities. (NB)

Ethnographic Study

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@ONE Technology Training Project Study

July 2002

The Center for Student Success

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Acknowledgments

The Center for Student Success would like to express its thanks to the following individuals and colleges for their assistance, without which, this report would not be possible:

Catherine Ayers, Director, @ONE Project, De Anza College

The @ONE technology training staff

Bill Doherty, Project Consultant

Robert Gabriner, Center for Student Success

Brad Rippe, Survey Webmaster

Fresno City College

Santa Monica College

A note about this project: This report represents the third in a series of four reports from the Center for Student Success study on the @ONE technology training project and good practice in technology. All four research reports are available at: http://www.rpgroup.org/cssweb/default.htm. Any specific questions about this report, or the Center for Student Success, should be directed to Brad C. Phillips at: Bradcphillips@yahoo.com.

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EXECUTIVE SUMMARY

The following report presents findings from an ethnographic study of technology integration and diffusion in two California community colleges. The study was commissioned by @ONE to examine whether faculty behavior and, in turn, student learning outcomes, have changed as a result of @ONE instructional technology training and resources. The findings were generated through site visits conducted in May 2002 to Santa Monica College (SMC) and Fresno City College (FCC) by researchers from The Center for Student Success. The ethnographic research is one part of a three-pronged study. Findings from the two other studies, a literature review of instructional technology and a survey of faculty technology integration and student learning and its relation to @ONE training, are presented in companion reports to this document.

In comparing the level and pace of technology integration at SMC and FCC, the research team found a contrasting pattern of development. While SMC has enjoyed steady expansion since 1985, FCC's path to technology integration was truncated until key factors combined to create a fertile ground for a new technology initiative in the late 1990s. Similarly, while SMC launched a strong technology training program in the mid-1980s, FCC's training, after a false start in the late 1980s, did not really take off until a decade later.

While the pace of technology integration varied, both institutions have recently seen the focus of their training change as faculty demand shifted from computer literacy and software-oriented training to more specific classroom applications. Correspondingly, the preferred format has changed from workshops that teach basic computer skills to sessions that help individual instructors integrate technology into a specific course. Intensive institutes remain popular, especially if provided outside instructional days and focused upon greater uses of web research, web-linked course resources, web-based course management and email for communication.

At FCC, an expanding and enthusiastic core group of users has integrated email communication and web research into a range of courses. Some instructors have gone farther, including an interdisciplinary group that is developing technology-infused learning communities. SMC has a large group of faculty who has integrated technology into the curricula across the disciplines. Individual faculty members are assessing how these tools affect student engagement and retention in courses using instructional technology.

Three primary variables had a pronounced impact on either supporting or compromising training initiatives in the two colleges: leadership, infrastructure, and funding. At FCC, it was not until the late 1990s that leadership at the college and district level made technology integration a high priority. The college's financial situation became stronger then and a major infrastructure project improved the network, despite continuing liabilities. Recently, more access to computers and the Internet has been provided for students and faculty. At SMC, the leadership has consistently prioritized instructional technology diffusion. The college has had an adequate network bolstered by a large IT support staff in place since the mid 1980s. They have also allocated considerable

resources for adequate access to computer labs for student work and faculty development.

Since 1998, @ONE's role at FCC was to support the early adopters and show the mainstream "what was possible" at the Summer Institutes; @ONE also connected FCC faculty in technology projects across the disciplines. At SMC, @ONE bolstered the early adopters and growing mainstream users of instructional technology. As for changing faculty teaching behavior in the two colleges, @ONE helped create a vision that supported technology integration. In both colleges, however, @ONE was only one of many drivers pushing technology integration at the colleges. It is difficult, if not impossible, to directly link @ONE's training to specific faculty changes. Suffice it to say that @ONE, California Virtual Campus Region 4 (CVC4) and on-campus training activities all contributed to advance faculty use of instructional technology, but that the impact of various training initiatives were influenced by the three variables noted above.

Overall, the findings suggest that regional training is most effective in the early stages of development and that local training is most effective during the later phases of curriculum integration. Training also needs to change emphasis over time, becoming increasingly individualized as faculty users master the basics and become more interested in applying new online tools to the classroom.

The findings also suggest that systematic and routine assessment of student learning is not yet under way across courses using the new tools. At this point, neither college has much more than anecdotal evidence to support that technology integration increases student motivation and performance, much less learning. At both colleges, faculty expressed keen interest in beginning such assessment.

The site-visit section concludes with a brief synthesis and with a discussion of nine factors that contribute to the integration and diffusion of instructional technology:

1. A faculty-driven initiative to identify what technology can do for student learning—by discipline and program,
2. A comprehensive cyclical planning process with a written, flexible Tech Plan that guides development without constricting it,
3. Local training and faculty development activities that reflect the needs of faculty for specific program curricula and identified student outcomes,
4. Commitment of the CEO, key administrators, and Academic Senate leaders,
5. A growing infrastructure with IT leaders who understand what students need for learning and what faculty need to generate learning,
6. A funding plan with a minimum annual percentage of the budget dedicated to learning technology,
7. Diffusion of curriculum integration by discipline or program areas,
8. Comprehensive assessment of learning outcomes with multiple measures, as developed from the process in the first factor, above, where faculty identify the best uses of technology for learning in their program, and
9. An Information Literacy graduation requirement and a commitment of instructors to train their own students in using course software or websites.

Site Visit Acknowledgments

The Center for Student Success and the research team would like to thank the following individuals for helping us plan rich and instructive site visits, and for having tremendous patience and grace afterwards when the research team kept returning with more questions and requests for clarification:

- Ms. Roberta Baber, CIS Instructor, Fresno City College
- Ms. Stevie Daniels, Coordinator of Academic Computing, Fresno City College
- Dr. Jannett Jackson, Dean of Learning Resources, Fresno City College
- Dr. Jennifer Merlic, Director of Computer Training, Santa Monica College
- Mr. Gerald Clark, Media Training Specialist, Santa Monica College

The research team would like to thank you all and the other faculty and staff that participated in the site visits for your time, expertise and willingness to share your experience with colleagues all over the state.

INTRODUCTION

In May 2002, a Center for Student Success research team conducted site visits to Fresno City College and Santa Monica College. The purpose of the research was to investigate at each of the two sites whether training in educational technology has changed faculty behavior and, in turn, student learning outcomes. Specifically, the research team was interested in exploring whether participants in @ONE training had integrated technology into their courses. Moreover, our focus was on hybrid courses, which are a combination of traditional on-campus, face-to-face courses with supplemental software or distributed technology assignments.

The site visit findings are summarized in a comparison chart that describes variables that affected the state and pace of technology integration at the two colleges. This is followed by a narrative that is divided into seven parts: 1) overview of the two colleges, 2) training activities and initiatives, 3) mobilizing development with key leaders and champions, 4) supporting efforts with the infrastructure, 5) funding initiatives and processes, 6) diffusing training via curriculum integration, and 7) assessing training needs and student impact. The review of the site visits is followed by a brief comparative analysis and a set of recommendations that may be of use to colleges that are strengthening their instructional technology.

METHODOLOGY

The research site-visit team asked the @ONE Director to identify four colleges that had reached a high level of technology integration and that had been frequent participants in @ONE's training services and other activities. @ONE's Director provided the names of four candidates and the team interviewed representatives from each campus. FCC and SMC were chosen because they had a large number of faculty members using technology in the classroom and because they represented two different types of colleges – one in a high-density, urban area of Southern California and one in a low-density, less urban region in the Central Valley.

In preparation for the site visits, the research team asked the technology training coordinators at each campus to identify faculty and staff members who would have the most to say about technology training and classroom integration. They responded by inviting local technology leaders to sign up for interviews, focus groups and classroom observations. The site visits occurred in mid-May, 2002; each lasted nearly two days and included interviews with 30-40 faculty and staff members. The research team made follow-up phone calls to collect additional information and to clarify questions that arose after the site visits had been completed.

On the next page, a table presents an overview of the comparison of the two campuses, based on a seven-part rubric.

Campus Comparison Overview
Site Visits, Spring, 2002

	Fresno City College	*Santa Monica College*
1. Campuses	*Description:* Central Valley, 20,500 students, 310 FT faculty.	*Description:* West of LA, 33,000 students, 340 FT faculty.
2. Training	• *Focus:* From basic workshops to classroom integration. Use of @One & CVC-4, but most now prefer local training. • *Facilities:* 10-month Coordinator; recent facilities upgrades.	• *Focus:* From basic skills & @ONE institutes, to thoughtful pedagogy, class management & Web; prefer local training. • *Facilities:* FT Director: excellent facilities.
3. Mobilizing	• *Leadership:* Uneven with different administrative leaders. • *Champions:* Senate and key faculty leaders. • *Faculty:* 30% turnover in 97-99; high turnover since.	• *Leadership:* Strong support at district and campus levels. • *Champions:* Senate and key faculty leaders. • *Faculty:* 30% of current FT faculty was hired since 1998.
4. Supporting Infrastructure	• *IT Staff:* Small: 10, services limited by resources. • *Network:* Slow bandwidth, other network liabilities. • *Access:* Students: 5 open labs, 230 stations; 6 days a week, limited hours; any teacher who wants a desktop computer has one.	• *IT Staff:* Large: 57, adequate, effective services. • *Network:* 60 servers; network very adequate. • *Access:* Students: 6 open labs, 350+ stations, 7 days a week; all faculty who want a desktop have one (90% of total).
5. Funding	• *Internal:* Limited, with gradual increases over time. • *External:* TTIP,VTEA, PFE, Title III, CCCOC • *Process:* Divisions & Learning Resources submit, Deans and President review, President lobbies District.	• *Internal:* Long-term strong district support for infrastructure. • *External:* TTIP, VTEA, PFE, CCCOC for instructional uses. • *Process:* Departments submit; Senate recommends, Tech Plan and District Tech Committee sets priorities.
6. Diffusing	• *Internet/Email Use:* Recent leap in both for curricula. • *Core Users:* Strong enthusiasm, keen sense of community. • *Curriculum Integration*: About 10% require Web class work.	• *Internet/Email Use*: Steady increases for broad curricula. • *Core Users:* At least 100 faculty post a course Web page. • *Curriculum Integration*: Nearly 15% require Web class work.
7. Assessing	• *Training Needs:* Surveyed 1998 and 2002. • *Learning:* A few faculty members do informal surveys. • *Anecdotal:* Interviewees report positive impact on students. • *Info Literacy:* Grad requirement; no entry assessment.	• *Training Needs:* Bi-annually since 1996; large data bases. • *Learning:* A few faculty members do informal surveys. • *Anecdotal:* Interviewees report positive impact on students. • *Info Literacy:* Requirement discussion, no assessment.

CAMPUS COMPARISONS

1. College Descriptions

Fresno City College was established in 1910 and it is the oldest community college in California. FCC is part of the State Center Community College District that is located in a low-density area of the Central Valley. It currently serves approximately 20,500 students. The college offers over 100 major areas of study and 60 vocational programs. It has over 300 full-time and 550 part-time faculty members.

Santa Monica College is located in the city of Santa Monica, in the western most part of the Los Angeles basin. The campus is in a relatively high socio-economic community. The main campus is crowded into a 30-acre campus. SMC has 33,000 students and 160 programs, nearly 350 full-time and over 700 part-time faculty members. Small nearby satellite centers house specific programs.

2. Training

Focus

Fresno City College began to offer technology related training to faculty members in the early to mid-1980s. Until 1987, when the college used Title III funds to hire its first Technology Coordinator, the training was delivered by faculty members who were given small amounts of release time to share their technology skills with their colleagues. The appointment of the first technology coordinator significantly increased and formalized the training, but the focus remained on technical training in different software programs. At the end of the five-year grant period, the position was eliminated and eight years passed before FCC hired its second and current technology coordinator. During the interim period, many of the faculty members who had served as technology mentors before the first technology coordinator was hired, resumed their work on a volunteer basis, offering more than a dozen workshops annually to faculty and an increasing number of classified staff members. The focus of the training remained on learning how to use basic software.

At FCC in 1997, a CIS instructor was appointed by the college president to serve as FCC's @ONE representative and to spearhead work on the college's third technology plan. The CIS instructor, also the Academic Senate president at the time, said that @ONE "opened her eyes to what is possible." She brought to her assignments a high level of technical expertise from a past job as a systems analyst and a continuous experimentation with new instructional technologies. Nevertheless, she felt "out of league with the @ONE group" because many of the attendees "although they weren't techies, knew lots more than I did about using technology in the classroom." At that time, FCC faculty had barely begun to experiment with technology applications and integration. Some instructors used PowerPoint presentations and one part-timer was working with the Web.

Participation in @ONE provided the CIS instructor with a greater level of understanding of what other colleges were doing and made her realize that "the key thing is to have a person at the college in charge of technology." Other faculty members who subsequently began to participate in @ONE events observed that the @ONE Summer Institute--always well attended by FCC faculty—fostered a community of technology users. Ironically, a counselor who attended the site-visit luncheon observed that it was at the @ONE Summer Institute where she met the FCC technology users from Business and Health Services. A Speech instructor from the English Department similarly noted that the Summer Institute provided her with the opportunity to connect with ESL teachers from her own college.

Around the same time that increasing numbers of faculty began to participate in various @ONE training activities, FCC reinstated the technology coordinator position, thereby achieving one of three priorities identified in the 1999 Technology plan. The new technology coordinator came from faculty where she had served full-time as an instructor of Linguistics and ESL. After accepting the new job in 1999, she soon developed and spearheaded delivery of a whole array of training activities including workshops, drop-in sessions, technical assistance activities and full training institutes.

During the past three years, FCC training has increased campus-based training services and sessions and has hosted CVC-4 (California Virtual Campus Region 4 at Cerro Coso College) and @ONE activities. The demand for training has begun to shift from workshop and generic training to more specific applications. The most important technology training service is thus beginning to be one where the technology coordinator works with individual faculty members to show them how technology can be used to enhance and enrich a specific curriculum. Another shift is an increased emphasis on technology integration that enhances teaching and learning. This includes support for FCC's newly formed and technology-infused learning communities, a series of grant-funded projects that have instructors collaborating to develop and implement inter-disciplinary, project-based learning activities that use technology to enhance the teaching and learning process.

Intensive summer training, influenced by @ONE's model, was one of the centerpieces of FCC's own Summer Technology Institute of 2001. The highly successful week-long event attracted 75 faculty and staff and offered three five-day threads. It also included a session on "Learning Communities" that provided the pedagogical underpinnings and practical information required to develop a viable learning community using technology. The two other sessions were Multimedia and Productivity, designed for faculty wanting to integrate multimedia into the classroom and Web Design and Development, designed for faculty wanting to design and develop a website to support their instruction.

At FCC, another area of training that is in increasing demand focuses on teaching instructors to deliver on-line courses. In this area, training provided through the CVC-4 "helped FCC instructors get over the hump." This was achieved when CVC-4 gave FCC a new media server and connected faculty with a mentoring system that pairs teachers interested in learning how to teach on-line with experienced on-line teachers. At the

present a growing number of faculty members are taking CVC-4 training to learn how to deliver courses on-line. The number of online courses offered has increased rapidly from 4 in 1999 to 22 in 2002.

During the interviews and in the focus groups, FCC faculty members agreed that technology training at this stage should be relevant, customized and preferably delivered in a way that builds community. Summer sessions and other trainings that are offered when they are away from the classroom are favorites. Also, many faculty members noted that they "like to walk away with something they can use right away" at the end of a training. By contrast, workshops – whether provided by local or regional providers such as @ONE -- are less in demand at this time because they are too general. Further, faculty noted that they are unlikely to use training that they themselves have to download and study. The concept is good, but "we never get around to using it."

At Santa Monica College in the early nineties, technology training was based upon needs assessment surveys focusing primarily on the basic computer skills, office software, and network uses. The most requested and frequently-offered training were workshops on using email, learning word processing, exploring Microsoft Office, and working with PowerPoint, to name a few. At the time, the Web consisted largely of databases that were not widely used by faculty until it changed to a graphical interface in 1994-95. Few "applications" related to teaching and learning were in the training itself; faculty were invited to develop uses that applied best to their own curricula. A few early adopters did just that, but they tended to learn the applications on their own. Some of those brave beginners went on to teach online courses, and some teach hybrid courses, a combination of face-to-face and online delivery.

Since 1999, a large number of faculty attended @ONE regional workshops and their annual Summer Institutes. The institutes were intended to take teachers and support staff into more depth on broad pedagogy and specific instructional applications of new technology. This emphasis positively affected training development at SMC. As training changed, the emphasis on uses of technology for student learning increased. The director of training alluded to @ONE's high-quality work; the college continues to host their regional workshops. A recent @ONE workshop was so crowded with attendees from other colleges that some SMC faculty members were unable to register.

Today, training at SMC is thorough, multi-level, and offers a wide range of opportunities, from intensive week-long group institutes to individual quick-shots in the hall before a class demo for students. Training recently received a solid boost when media trainers did a ten-minute "dog and pony show" at department meetings on what's possible and what's available in SMC training. The training staff is focusing more directly than in the past on course applications for the Web. Training for Prometheus, for example, included basic uses and then about 80 interested instructors piloted its uses with at least one class in Spring Semester, 2002. The research team interviewed volunteers from the new Prometheus users group and found that they had widely differing approaches to the tools in the course management program (see part 6, Diffusing) and that one-on-one training evolved to fit their needs. Some of the interviewees recognized the need to

learn more about styles and ways of learning so they can use these tools effectively with students to enhance their learning.

Other current training activities involve Photo Shop and similar graphic programs, audio and video clips for class web sites, and a broad range of uses for the Internet. Few instructors still request basic software training for the development of hybrid instructional technology.

A few faculty members also teach online and took the UCLA or the CVC-4 courses in teaching online—both are online curricula for community college instructors. All training is accompanied by extensive manuals, one-shot handouts, and application suggestions. Incentives for training have been Flex time credit, free software programs, and the smart but standard lure of food or candy. At one point, the college decided that the requirement for getting a free computer was to attend a series of workshops in computer basics, the SMC environment, Internet skills, ergonomics, and troubleshooting.

Facilities

At FCC, the technology training facility has, for more than a decade, been housed in a former classroom in the Media Center. For the past six to seven months, as the college has been upgrading its networking infrastructure, the room has been used as a staging area for the installation of a server farm and therefore closed to training. Adjacent to the technology training facility, FCC is developing a Teacher Technology Resource Room. This facility will offer faculty access to state-of-the-art equipment such as advanced CD burners, digital cameras, software integrating video into the computer, and other tools that can help them use technology to improve teaching and learning.

At SMC, the staff positions for training include a full-time Director of Technology Training and Research and two full-time Educational Computer Specialists. These two trainers are available at all times to help drop-in faculty and staff; they conduct the bulk of formal and many informal workshops. Without them, agreed most of the interviewees, the support for training and development would not be adequate.

The SMC facilities themselves might be referred to as "an embarrassment of riches," at least in comparison to other California community colleges. The Technology Training facility is several years old, has 19 state-of-the-art PCs and is pleasantly spacious; it is nearly double the size of a traditional lecture classroom. Adjoining office space for the trainers allows easy visibility to faculty members who make appointments or drop in for help. The training lab has one large, speedy black and white printer networked to all stations and an available color printer. There are also 13 individual computer stations available on a drop-in basis in another section of the Media Center building that are especially helpful to adjunct faculty members who usually do not have office space in their departments.

A recent Flex event (Fall, 2001) led by the Director of Technology Training was "standing-room only" in the media training center. The attendees were very impressed

with the demos and enthusiastic about moving forward with their own curricular adaptations, according to the respondents to their session evaluation. They perceive the training staff as responsive and knowledgeable, and one faculty interviewee wished that more faculty members used these great resources. Another form of training is the informal departmental helper, an early adopter who knows the curriculum from the inside. An ESL teacher reported that she preferred this type of support.

3. Mobilizing Development

Leadership

Since educational technology began to take hold in the late 1970s and early 1980s, FCC's presidents have been highly supportive of technology diffusion. As an illustration, the very first thing a recent college President said to one of the campus technology leaders was "There is no network connection here, did you know this?" The same President went to battle at the District Level for more technology funds. Here, after allocating $500,000 for technology development at FCC, the Chancellor is reputed to have said, "This is the last time I will give you this much money for technology." To this, the FCC President responded "No, this is the LEAST you will ever give me for technology." The current District Chancellor is very supportive of technology integration. When a new FCC president is chosen, he or she will very likely be an advocate as well, given the technology leadership and momentum now in place.

Among administrative leaders at FCC, the Dean of Learning Resources has been a strong and persistent leader, always pushing the technology agenda and working hard to identify ever more resources to support faculty technology integration. A highly-respected person, the Dean of Learning Resources was appointed in 1997 with the main responsibility for coordination of technology, the first dean devoted largely to this task. This person was also the first technology coordinator from 1987-1992. She was thus already highly familiar with FCC's technology needs and priorities and she enjoyed close ties to the key players advancing technology projects. Since her appointment, she has worked with technology advocates to push for funding of the second technology coordinator, for more space, more IT staff and more overall technology funding. The dean-level position and the track record of her collaboration with "allies" illustrate the progress possible with CEO supportive leadership.

At Santa Monica College, the leaders of instructional technology include the Academic Senate leadership, grass roots faculty, key leaders and upper-level administrators, including the CEO. According to interviewees, key players in the early stages included a Coordinator of Instructional Computing, a reassigned faculty member appointed as early as 1987. He took the initial steps to get campus computers and distributed systems. In the mid '90s, the position was replaced with two full-time administrative positions: the Director of Academic Computing and the Director of Technology Training. Since that time, upper-level administrators have supported the extensive development of the networking infrastructure, the staffing, the equipment, and other aspects of the development of instructional technology.

Champions

At FCC, the Academic Senate has played a key role in moving forward the technology agenda. The Senate has been in a prime position to do so; its presidents have passed almost without interruption from one technology advocate to another. Indeed, the past senate presidents include the CIS instructor who wrote or co-wrote several of FCC's technology plans and who served as FCC's first @ONE representative, the first faculty member to offer an on-line course, and FCC's first Technology Coordinator and current Dean of Learning Resources.

Through these champions and the network of leaders around them, FCC has had a constant center of power to push the technology agenda, lead the quest to hire a Technology Coordinator, upgrade the technology infrastructure, and place technology upgrades on an upcoming bond measure. Adding strength to this group of champions is the fact that many of them are veterans with the college and thus both well-connected and well-versed in moving their own agenda forward. Among the leaders of this group was the CIS instructor who assumed the presidency of the Academic Senate in 1997. The same year, she was appointed by the College President to lead development of FCC's third Technology Plan and to serve as FCC's first @ONE representative. As this technology champion says: "This was the year when all the pieces began to come together," when the funding situation improved, the college began infrastructure improvements and the first Technology Coordinator returned to the college in her new capacity as Dean of Learning Resources.

It was in this enabling environment that the CIS instructor returned from @ONE with "a vision of what was possible." At that point, the college already had a core group of technology users who had achieved a high level of computer literacy and now wanted to learn more about the Internet, email and other applications that may be of use in the classroom. During the next two years, FCC champions pushed successfully for the campus to hire the second Technology Coordinator and to upgrade the campus technology infrastructure. The research team had the opportunity to meet many of the champions in individual interviews and at a luncheon focus group. Here was not just a group of advocates but a community of technology users. When asked how they had met, several participants mentioned intensive technology sessions hosted internally or externally by regional providers such as @ONE.

At Santa Monica College, there are two primary committees that govern progress: the District Technology Committee and the Academic Senate Information Services Committee. The more recently developed District Technology Committee has a multi-level membership of faculty, classified, administrators, and students. This committee's role includes primarily MIS, student service needs, and funding. The Technology Plan, first developed in 1991, is reviewed by both groups; departments and divisions individually submit their needs for technology in the Plan.

The Senate sub-committee is made up of faculty with invited administrators and others as the agenda warrants. The role of this committee is to discuss faculty issues and their needs for instruction and general usage. At the meeting attended by the interviewers,

attendees included representation from social science, the library, disabled students, business labs, training, IT, and the Academy of Entertainment and Technology. Their agenda focus, among other areas, was the computer use policy that will receive a first reading soon by the Senate.

Faculty

Contributing to the many changes at FCC that began to take hold in the late 1990s was the beginning of a wave of retirements that saw faculty members leave in large numbers--some of whom were skeptical about technology. Between 1997 and 1999, about 30% of faculty left, paving the way for a generation of instructors who, for the most part, have always used technology. In fact, few of them would consider planning a course without it. Since 1999, the steadily increasing ranks of new faculty have been similarly inclined, although interviews rarely require demonstrations of instructional technology. In meeting the new faculty members, the research team noted that its representatives were extremely knowledgeable about technology, but that they approached the challenge of integrating it into the classroom differently from their more established colleagues. Many of the new instructors view technology as just another tool that students can use for learning.

Much like FCC, Santa Monica College has had a large faculty turnover since 1998, making 30% of their faculty new to the college since then. Perhaps more telling is that about 45% of the current faculty was hired since 1995. Most of the interviewees among the teaching ranks were hired within the last three years. In the long term, this large turnover is likely to affect the development of instructional technology; however, job descriptions and the hiring processes do not always include "required" instructional technology skills, but certainly include "preferred." Ageism to the contrary, SMC has not necessarily added mostly younger faculty among the recent hires.

It is important to note, however, that all of the SMC instructors interviewed for this study are new to the college in the last three years. One interviewee, recently hired, told us that her technology skills were more than likely a consideration by her colleagues when she was interviewed. She had also been a part-timer who was known to be an excited advocate of the benefits of new technology to students—and what's more—she openly shared her expertise with others.

4. Infrastructure

IT Support

FCC has ten technology support technicians and specialists, including the Coordinator of Academic Computing. Additional IT staff includes a Distance Education IT Support Technician, two Computer Resource Technicians, a Network Coordinator, and 4 Micro Computer specialists. With 310 full time faculty members, the "caseload" per IT person is about 31 instructors each. The core IT staff is assisted by a varying number of part-time computer and other technology support staff. Many of the part-time technical support staff is students. Last year, thanks to a strong push delivered by the Dean of

Learning Resources, five full-time positions were added to the technology support staff. With almost all faculty and staff having at least one computer each, and with student labs expanding rapidly, the support staff is still too small to meet the continuously growing demand for assistance.

For Santa Monica College, it could be said that the network infrastructure and the services of the IT department available to faculty is slightly ahead of demand. As faculty members continue to hear about new approaches, notice the interest of colleagues, and broad training continues, the demand will require an even stronger infrastructure. The adequacy and efficiency of the current infrastructure is due both to faculty interest, the Information Technology Department, and the District's commitment to technology.

The IT staff includes 57 people: 17 in Academic Computing, 15 in Media Services, 9 in Telecommunications, 9 in MIS, 4 in Networking, and 3 in Technology Training. About half of the services, staff, and networks are committed to academic uses, as opposed to MIS systems. The 17 in Academic Computing support the student use computer labs, about 23 of them in all, including all associated servers and peripherals. The 3 in training provide "How-To" support for faculty or staff, and those in Telecommunications support the desktop computers in office areas. While the department may soon be re-organized, the adequate IT support is very convenient for faculty and students. Faculty interviewees reported pleasure with the timeliness of responses to their service requests, sometimes within the hour. This is in marked contrast to other colleges with far fewer resources.

Network

Infrastructure development at FCC has often lagged behind the college's technology training activities and faculty's motivation to push forward. For years, the college was inadequately wired. One of the faculty members recounted a story where she and her colleagues, in protest over the lacking infrastructure, threatened to put brown bags over their heads during a site visit from a technology team from another college. The situation improved with the completion eighteen months ago of a major project that made the Internet available in all buildings. Several instructors, however, complained that infrastructure problems persist. In fact, faculty members have to communicate with each other via external servers. The network backbone is two fiber optic rings, completed in 1998. At that time, half of the faculty had Internet connections; Business, Health Science and Math/Science/Engineering lead the way. The Social Sciences, Economics and other Liberal Arts facilities had partial Internet connection, and some administrative and service buildings did not.

At this time, FCC still has infrastructure liabilities, a point that was driven home to the research team during an observation of a geography course where students accessed a hyper-linked web site with PowerPoint slides and other graphics. The geography instructor cannot leave large files on the hard drives and students may not work from the server, so the instructor has to arrive at 6am each time the class meets at 8am to download course files to 24 computers. Afterwards, he must reverse the task, a time-consuming process. If one or more of the computers is down, there is no IT staff

available before 8am. One has to ask: how many instructors would be willing to go to that length to integrate technology? And, how many instructors are balking at using technology because glitches like these make extra work and uncertainty.

At Santa Monica College, on the other hand, the networking and bandwidth is truly superior. It allows continuing opportunities with few limitations in the development of instructional technology. They have come a long way from wiring dumb terminals to nearly-finished wireless hubs in the library's comprehensive renovation. The rest of the network is fully wired with fiber optic cabling throughout all buildings at the main campus and at their satellites. The network supports a full complement of college and course web pages and extensive graphics, over 700 faculty homepages, and over 100 users of the dedicated space on the Web at "myclassess.smc.edu." The network speed also supports fully linked web pages and course management software for developing comprehensive uses of the Web for instruction. Registered students may apply for college email accounts. Over 60 servers manage the network's storage and traffic.

To some extent, one could argue that the available SMC network technology is ahead of the demands of the faculty. Extensive threaded discussions with a large archive, for example, might consume available network resources, but as yet this has not occurred. Without this "growing space," the faculty could become easily discouraged by network sluggishness; therefore, this gap between resources and demand is highly positive for potential growth among mainstream faculty. As on nearly all campuses, SMC faculty will need to keep up with student expectations for adequate technology and instructional uses which remain high. This was found to be true among those in the focus groups and as reported by faculty interviewees during the site visit and follow-up phone interviews.

Access

In 1999, Fresno City College provided students with access to 658 computers divided across 24 computer labs in Business, Technical Industrial, and Vocational Training. Today, in 2002, the number of student computers has increased to 1,430 divided across 47 labs. The campus has five open labs and about 1,200 computers in classroom/lab settings that are dedicated to specific use within courses. None of the labs stay open very late into the evening, or have extended weekend hours. Students have Internet/email access in all Business labs, the Math, Science & Engineering labs, the Library and in all the open labs. The library offers both customized workshops and individual instruction in how to use technology for library research. It also has 32 computer workstations students can use for doing research on the FCC library databases. The Library Technician estimates that last year, 3,000 students either participated in the workshops or met with him individually to learn about library technology research.

In 1999, faculty and staff had access to 500 computers. Three years later, virtually all faculty members have their own desktop and the campus had two faculty/staff only labs. In the January 2002 survey only 5 of 94 instructional faculty members who responded indicated that their computer is NOT connected to the Internet. Almost half of the

respondents, 46 faculty or 49% of respondents, said the connection is fast enough to satisfy their needs, 39 of their colleagues (42% of respondents) said it is sometimes fast enough, and 14 others (15%) said it is not. Among respondents from Student Services, 10 said it is fast enough, 7 that it is sometimes fast enough, and 4 that it is not.

At SMC, access to computers and network resources for both students and faculty is advanced, to say the least. Students have available six open-access labs with over 350 stations. Two of the labs are open long daily hours, seven days a week. Thirteen labs that are dedicated for class sessions also provide some overflow for computer access. A total of 1,260 computer stations cover both open labs and dedicated classroom labs, including 60 laptops. Three of the open-access labs are open to students on evenings and weekends as well. These labs and training spaces are in first-rate condition with equipment that is under three years old.

All full-time faculty members (about 90% of the 340) who want a computer on their desk have them as of May, 2002. Compared to other community colleges in the state, SMC provides excellent equipment for its faculty and adequate support. Today, nearly all desktops are recent models; the research team did not see any computers that were more than two years old. There seemed to be few complaints and many compliments about the speed of IT staff response to requests for installation and maintenance.

5. Funding

Internal

FCC now funds much more than the $500,000 first approved for technology. District allocations presented in FCC's Technology Use Plan of 1999 helped draw the picture. In 1996-97, technology related expenditures exceeded $1.6 million, a figure that represented 13% of the non-fixed budget for the entire District. The "Fixed" budget includes salaries, benefits, utilities, insurance, etc. The next fiscal year, 1997-1998, the allocation had increased to more than $2.9 million, approximately 20% of the non-fixed budget.

Another major source of FCC's funding may become available in the Fall, 2002, when FCC has a bond measure on the local ballot. Technology is one of four or five major projects for which the college is seeking bond support, and several of the FCC technology leaders noted they worked very hard to ensure that technology was included in the ballot measure. If the bond is approved, the college will create a state-of-the-art Technology Center with multiple open labs in an old administration building.

Santa Monica College supports the network infrastructure and instructional technology from various sources: federal, state and local. District funds support the IT staffing, the MIS system, and the network. Importantly, students contribute at least $100,000 per year from their student body ID cards. Passed in March, 2002, their bond will support facilities and state-of-the-art technology.

External

FCC's most important sources of technology funding include VATEA, Title V, Partnership for Excellence, Lottery Money, a former Title III and TTIP. As an example, the Title III grant of 1987-1992 funded computer labs, a Technical Coordinator position and summer sessions on technology applications. The current Title V supported FCC's 2001 Summer Technology Training Institute. With serious reductions next year in state funding, the bond issue could become even more pressing. At the FCC focus group luncheon, the research team asked how many participants had written their own grants requesting funds for equipment and other technology-related items and activities. Almost everybody in the room raised their hands. In individual interviews, several faculty members also talked about their pursuit of funds and grant writing activities that had targeted internal and external sources.

External resources for SMC include federal funds such as the former Title III and the current Title V, although the latter funds support Student Services programs. Other resources come through the state chancellor's office: VTEA, PFE (Performance for Excellence), TTIP (Telecommunications and Technology Infrastructure Program), block grants, and other categorical programs. State library funds require matching District funds and are used largely for technology. The grants office has brought in external incentive funds for faculty development. For next year, seriously reduced state funds could affect the development and the diffusion of instructional technology. For example, TTIP funds will be cut by about 45%. The good news is that Santa Monica is slightly ahead of the game in terms of resources and a year or two without the usual funding may not affect development as much as in other colleges operating with tighter budgetary constraints.

Another external funding source for Santa Monica College is its strong links to the private sector, especially in the media and entertainment community in the Los Angeles area. UCLA also plays an important collaborative role in technology development. The VOH (Virtual Office Hours) project is an example of an important innovation in the history of SMC's support of faculty and student interaction and it fostered new uses of the Web. The university, the college Foundation, the Dreyfus Foundation and state funds were part of its development. The project was developed early on to facilitate web-based communication for faculty and students 24 hours a day, 7 days a week.

Process

At FCC, each division establishes its own technology needs and priorities and the Dean of Learning Resources does the same, but on behalf of the whole college. Representatives from each division and the Dean of Learning Resources then compete and lobby for their priorities with the Dean of Instruction or the Dean of Students. Next, all key players negotiate with the FCC President to advance their priorities. As the last step in the process, the FCC President advocates for his campus priorities at the District level.

At this point, the SMC District budget does not have an annual required percentage allocated for instructional technology, but the District Technology Committee takes annual Technology Master Plan recommendations from department technology requests and the Senate Information Technology Committee. The Senate recommends academic technology priorities to the District Committee that makes requests to the District. The Technology Master Plan document, while updated yearly during the budget cycle, is overhauled every four years. The research team visited a routine meeting of the Senate Information Technology sub-committee. They submitted a Computer Use Policy for first reading to the Senate that recommends responsible computer uses across campus.

6. Diffusing

Internet & Email Use

At FCC, a survey conducted by technology leaders in 1998 and again in 2002 shows faculty Internet access up from 50% to almost 100%. The same survey comparison finds that while in 1998, one-third of respondents rated themselves as "Technology Beginners," nobody felt they belonged in this category four years later and only 25% of respondents indicated they were "Technology Novices" -- one step up from beginners. Further, in 1998, the vast majority of faculty used computers mainly for word processing purposes. Only 8 respondents (6%) indicated they posted class materials on the Web; 35 (26%) e-mailed with their students; 65 (48%) used the Web for research purposes; 39 (29%) used multimedia presentations. Four years later, 21% of respondents posted class materials on the Web; 91% emailed with their students; 93% used the Web for research purposes; and 53% used multimedia presentations.

At Santa Monica College, similar studies found very similar results. The faculty interviewees, however, were piloting the Prometheus course management system; the system includes course information and linked resources on the Web and various uses of email and course discussion tools for contact among students and with the instructor. One interviewee from ESL reported that she uses email to communicate with the students, which makes it easier to respond to the many different problems students have. She also has students using the WEB for research assignments, often pairing those from different skill levels for language practice. She is pleased with student responses to these uses of the software product.

Of course, Prometheus points to a training and diffusion challenge, typical of software market forces: the software has been purchased by Blackboard and will not exist in two-three years as it is. But once instructors are comfortable with using one product in generic programs, they will be able to transfer to new products fairly regularly. With the speed of software product improvement in a market economy, there may not be a learning curve any longer; the curve will become a continual incline.

The SMC library is another critical source for developing and diffusing Web uses of instructional technology, as the staff is very supportive. The faculty interviewees reported that librarians offer excellent workshops and curricula on the uses of the Web

for research and information resources, and they host class demonstrations on uses of online libraries and databases for course assignments. Instructors are often students themselves in these courses.

Core Users

FCC has a strong, enthusiastic and interdisciplinary core group of users. It includes individuals who have championed technology for decades as well as newcomers who were "born" with laptops in their arms. The group estimates that some 10% of faculty members integrate technology into their courses, mostly through web-based and email applications. The group also noted that it performs its own advocacy. As an illustration, an instructor explained that the technology users in her department have begun to deliver presentations to their less technology minded colleagues. "It is like marketing," one instructor said. "It works most of the time. When [colleagues] see how technology can be applied in the courses they are teaching, they become interested."

At SMC, the interviewees and the staff estimated that nearly 15% of FT faculty members require Web assignments for their courses. The most broadly-developed uses of instructional technology remain in the Computer Information Science in the Business Department and at SMC's Academy of Entertainment & Technology, which prepares students for technical and design careers in the entertainment industry (i.e. digital animation, web design, etc.) Other strong users by departments or divisions are Composition, ESL, math and science curricula, and Modern Languages. The English Composition faculty was among the first to use technology for teaching outside the computer science instructors. Word processing was used as early as 1987 as the vehicle for practice and learning, as compared to using word processors to teach word processing in the Business Department's office practice courses.

Other SMC vocational areas appear to use technology to an equally high degree. Nursing, for example, has many users of new technology. Besides using course management systems such as Prometheus, these instructors also use instructional technology for course discussions, for email contact among students, between students and instructor, and for Web resources.

Curriculum Integration

At FCC, the use of Web and email resources has escalated rapidly over the past years. However, the college is still far from reaching a level of technology integration where a larger number of faculty deliberately use technology to advance the seven principles of good practice.[1] Yet, FCC has taken one important step in this direction with the recent

[1] *The Seven Principles of Good Practice* first appeared in 1987 (Arthur Chickering and Zelda Gamson). They include active learning, maximization of student-teacher and student-peer interaction, communication of high expectations, prompt feedback, emphasis of time-on-task and respect for different learning styles. In 1996, Arthur Chickering and Stephen Ehrmann suggested technology integration and diffusion be guided by the Seven Principles: Chickering, Arthur and Stephen C. Ehrmann (1996), "Implementing the Seven Principles: Technology as Lever" AAHE Bulletin, October, pp. 3-6. Which kinds of technology use can help faculty and students implement Chickering and Gamson's "Seven Principles of Good Practice in Undergraduate Education?" This classic essay summarizes some of the key possibilities.

development of technology-supported and inter-disciplinary learning communities. Further, faculty expressed strong interest in using technology for teaching and learning

In classroom observations in Fresno, the research team saw several examples of how faculty members from a variety of disciplines are using technology in the classroom. A Zoology instructor reviewed different bird websites with students to give them a sense of the many resources they could consult to develop an assigned PowerPoint presentation. A Geography instructor had students listening to audio mini-lectures while accessing a hyper-linked web site with PowerPoint slides, photos, maps and other graphics. A Computer Literacy instructor worked with groups of students to help them develop individual parts of a class PowerPoint presentation on the cosmetic surgery business. And a remedial class had students taking tests on-line to help them identify their strengths and weaknesses.

More specifically, an FCC Zoology instructor explained how he is working with an English instructor on an inter-disciplinary technology project that challenges students to develop and present in K-12 classrooms PowerPoint presentations that introduce the younger students to the subject of zoology. In this collaboration, the instructor helps students with the content and the English instructor makes sure the presentation is well-organized and error free. In most other instances, the linkage between training and classroom applications may still have been strong, but in looking back faculty attributes their interest in and use of technology to a variety of factors. One recurring theme, though, was that most faculty members have had direct interaction with the Technology Coordinator and that the fact that she is there to help out makes a big difference in their willingness to experiment with technology.

Although none of these activities can be directly related to @ONE training, most technology users at FCC have participated in one or several @ONE training sessions. The skills, confidence, motivation and camaraderie they gained there – and at other technology training sessions – have contributed to opening their eyes to the possibilities of technology.

For SMC, to encourage curriculum integration and its diffusion, the college provided incentives to technology department liaisons that helped their colleagues with computer skills and applications to the curriculum. The "tech liaisons" were in effect from Fall, 1998, through Spring, 2000. Several of those individuals still serve in a similar but informal capacity. Some, for example, still write their department's annual technology request. Apparently the informal structures work more effectively today. The research team visited one of these volunteers who helps her colleagues in ESL. They find her help more valuable than some kinds of training because it is both handy and immediately curriculum related. The disadvantages of informal liaisons may be, however, that volunteers could burn out quickly with the time demands of helping colleagues.

An instructor in developmental composition, for example, is using many functions of the Prometheus software, including the testing function. She shared with us her test of

writing conventions of summarizing, citing sources, and plagiarizing. Students take the test online and the descriptive data are available as student responses are submitted. She reports that students like the immediate feedback on progress in the course in the grade look-up function; other instructors reported similar positive student opinion. Two instructors in Computing Science shared their uses of the course manager. They also shared a survey—developed by one and adapted by the other for the same curriculum. This sort of diffusion is a natural and an ideal way for curriculum integration to occur: office mates teaching the same course can reduce the development time by sharing resources.

An instructor in Biology suggested that many students initially resisted the course management program. They found the learning curve a little steep, as the number of functions appeared to be daunting. She and other teachers noted that they had to devote class time early in the term to orient and encourage reluctant users. She offered extra credit to students to develop ideas for uses in features she had not yet used.

7. Assessing

Training Needs

In the 1998 version of an FCC survey, all respondents – including faculty, student services, administrators, classified staff, learning resources – were asked to indicate what technology they would like to learn more about. The top three priorities were all Internet related: Advanced use of the Internet (108 responses), Using the Internet (98) and Research Using the Internet (90). The runner up was Using Windows (95 responses). When considering these findings, it is important to note that the menu of choices respondents could choose among were oriented toward skill development and did not include questions about participants interest in applying technology to improve teaching and learning.

At SMC, training and development surveys of faculty and staff have been conducted about every two years. The interviewers reviewed the data from reports on surveys in 1996, 1998, and 2000. Some SMC faculty and staff participated in @ONE's needs assessment in 1998 and again in 2000. The primary changes in the data since first assessed in 1996 were 1) reduced requests for desktops (those that want them already have them), 2) reduced requests for Word and Power Point, 3) increased requests for Internet and Web development, and 4) multi-media such as Photo Shop.

The last survey on training needs at SMC was conducted in 2000. Considerable data from faculty, as well as students, is available from these instruments. The focus on technical software training and online tools is similar to the emphasis in @ONE's survey, and typical of most other California colleges. Faculty from SMC participated in @ONE's survey in 1998 and again in 2000. The data in all cases changed from earlier needs for basic technical training to new approaches using Web resources and other networking advantages of the Internet.

Student Learning
Fresno City College's surveys reveal that a great increase has taken place in faculty use of email, Internet research, multimedia presentations and other technology applications. They do not, however, explore whether and how technology is enhancing solid pedagogy or teaching and learning. Many instructors expressed strong interest in collecting this kind of information. At this time, however, the assessment of how technology enhances student motivation and learning remains entirely anecdotal.

At Santa Monica College, assessment of student learning and students' uses of instructional technology or specific course learning outcomes is not yet developed into formal research. Students have, however, been asked about their access to computers and to the Internet at home or at work, their skill levels with computers, and other aspects of their needs. Of course, the responses have changed dramatically over time as their access to home computers and online resources has improved. Their location in a higher socio-economic area no doubt affects the higher levels of student access to computers and the Internet.

Informal surveys by individual instructors at SMC are more common. Feedback from students has helped shape changes in technology uses by faculty. One CIS instructor reported that he developed his own online surveys in order to get the most timely and useful feedback from students. He reported that the anonymity helps students give him useful, forthright information for improvement; in one course, for example, he changed the textbook based on student survey responses.

Students took the feedback survey online from the course site; the instructor sees only the accumulating aggregated data, not individual responses. In the instructions that accompany the survey, students are told that their feedback will help improve the course and they are encouraged to give honest answers. About a third of the questions focused directly on the technology enhancements to an otherwise traditional lecture course: uses of Prometheus, the website resources (ease and usefulness) and email response time from the instructor. Other items ask students about the lectures, the assignments, the text, current grades, and student perceptions of engagement in the course, relative to other courses.

Anecdotal Evidence
At FCC, a Zoology instructor believes that technology helps to make his courses more exciting, providing students with opportunities to learn in many different ways and enabling them to communicate with the instructor in the way that is most comfortable for them. One of his students confirmed this by noting that "I would never call the instructor over the weekend, but emailing him is a different thing." In a Computer Concept course, students said they felt they learned more from working in groups with assignments that require the use of presentation tools than they would in a lecture course. They also said they liked the visual aspects of working on the screen as opposed to merely listening to a teacher talk.

A Geography instructor believes technology applications help students persist at a higher rate, increases their engagement and improves their achievement. The counselor coordinating the probation courses delivered through Student Services believes multimedia applications engage students and that technology can be a great tool for motivating and teaching failing students. This is the case both because students "like" technology and because having access to technology enables the instructor to plan lessons that appeal to many different learning styles, including visual learners.

All of the interviewees at SMC indicated that they believe students are benefiting from the use of instructional technology, especially the resources of the Web. Some instructors emphasized the richness of communication and discussion among students, and the timely information they can provide through email. Others found that motivation is heightened when students can quickly look up their grades and see their progress on specific assignments.

Another faculty member suggested that students are much more engaged when they can find information and model learning projects easily. She added that "it certainly makes my life easier" in terms of providing rich learning resources. Another instructor noted that even the weakest students responded well to using email and web links. The excitement and motivation may be in the new skills themselves, but the curriculum appears to engage students who can find resources from so many sources when they are linked to the class web page. It is most gratifying to hear that the second-language students are using the discussion features with fluency and aplomb. This is not usually the case with students who are ordinarily reticent because they are often embarrassed by their language liabilities.

Information Literacy

Although FCC has a computer literacy requirement for graduation, there is presently no test in place to assess technology literacy when they enter the college. As more courses use technology to deliver instruction, such a test is becoming increasingly necessary. For example, classes that use Blackboard may be extremely difficult for students with little or no computer experience; downloading course information from the teacher and submitting class assignments can abort motivation and retention.

At SMC, students' information literacy skills are currently tested at enrollment; however, a graduation requirement is now under discussion. The library's web research course or a version thereof is a potential course requirement under review. Another option is a test of students' skills in managing and evaluating information overload on the Internet.

SYNTHESIS: COMPARATIVE STRENGTHS

In summary, what are the comparative strengths of each?

The strengths of Fresno City College, as the research team observed and studied them, include the diverse group of a community of faculty champions and the enthusiasm of a new wave of faculty. Still, they are hampered by inadequate funding for the infrastructure and the IT support staff. The hiring of the Technology Coordinator and the

people around her has generated excitement and bodes well for the future. With District leadership support and passing of a bond measure this year, funding for a new technology building are good prospects for continued growth. It is also likely that the current trend towards training that can be used immediately in the classroom will be sustained, and that more emphasis will be given to training that emphasizes benefits to learning.

The strengths at Santa Monica College include the highly adequate infrastructure and support staff, the District priorities for technology initiatives, and the range of involved, enthusiastic faculty across many programs. No less a consideration about the strength of SMC is that the college has long identified itself with cutting-edge technology, partly in preparation of the high proportion of transfer students in a high-tech area of the state. Their training focuses more on software and uses of the Web for learning.

What did the research team learn from comparing the two campuses? The development of technology at Santa Monica College has been well funded and has grown steadily over the last 15 years. On the other hand, Fresno City College has battled funding constraints and uneven development in the same period. Both colleges have seen changing needs over time and both were affected in the late nineties by the resources of @ONE. For Fresno, @ONE was critical; for Santa Monica, @ONE was beneficial, but supplemental. Each college faces the need to provide local training and is focused mostly on distributed technologies and specific, course-related software. In spite of trainers' roles that support both faculty and staff training, the faculty on each campus is moving toward Web resources for teaching and learning and away from discreet software. In the near future, both colleges may be hampered in all of these efforts by impending state cutbacks.

What is missing on both campuses, as it is across the field, is comprehensive research on learning outcomes with instructional technology. Another very important variable is the relationship between training, faculty behavior and student learning, which also remains largely undocumented. Without this it is not possible at this time to yield much more than anecdotal evidence on the relationship between training, faculty behavior and student learning.

RECOMMENDATIONS

Enabling Factors

In order to launch successful instructional technology, colleges need to compare their environment to the environment of those colleges that are already further ahead with instructional technology. Successful colleges vary enormously, and innovation thrives in unlikely places. Most innovation development occurs in fits and starts—even when resources are plentiful. In reviewing findings from the site visits and conferring with colleagues who had completed the other two phases of the study – the literature review

and the survey – the research team identified nine factors for enabling and diffusing instructional technology in hybrid courses:

1. *A faculty-driven initiative to identify what technology can do for student learning—by discipline and program.* From this list of outcomes, teaching faculty must identify the signs--or yes, the measures--of learning when using instructional technology. This work should drive the Tech Plan and the assessment of what each college is doing to diffuse instructional technology in hybrid courses or programs that combine the best of face-to-face practices with the best learning technology.

2. *A comprehensive cyclical planning process with a written, flexible Tech Plan* that guides development without constricting it. Programs or departments will annually submit their needs to the Tech Plan (as they did on both campuses visited), based on outcomes data in particular programs. They should thoroughly update the plan every three years, given the pace of developing hardware, software, and networks.

3. *Local training and faculty development activities* that reflect the needs of faculty for specific program curricula and identified student outcomes. Our current model of staff development is still the traditional approach to discreet workshops that are disconnected from the classroom. A more effective model includes incentives for comprehensive approaches that include training, planning, piloting, assessing, and even presenting results to colleagues on campus or at conferences. As the field grows, the demand for training should shift from generic workshops to individual consultations, based on the *Seven Principles of Good Practice* (citation, page 18).

4. *Commitment of the CEO, key administrators, and Academic Senate leaders.* It is nearly impossible to sustain continuing growth of instructional technology without serious support from the top, the Senate leadership, and key faculty champions. Internal political wars will drain energy from thoughtful, gradual development; these wars are even more devastating than budgetary cutbacks. Every hiring committee for upper-level administrators and deans should consider candidates who are open to the best uses of instructional technology.

5. *A growing infrastructure with IT leaders who understand what students' need for learning and what faculty need to generate learning.* In some colleges—not those the research team visited—there is still a large gap between the academic needs for technology and those for administrative, MIS needs. In some cases, the staff itself has too little training in instructional technology or even networks; their training may have been in mainframe programming and colleges must support updating the skills of its IT staff in order to serve instructional needs adequately.

6. *A funding plan with a minimum annual percentage of the budget dedicated* to learning technology. Any given year might fall above it, but a budget policy minimum assures maintenance of progress, if not innovation. Colleges will need to supplement district expenditures with large and small grants from state, federal and

private sources. Individual faculty members can seek their own grants, but this approach often strengthens one course and leaves programs inadequately served.

7. *Diffusion of curriculum integration by discipline or program areas.* Diffusing instructional technology is still in its infancy, but it is time to move past individual faculty member's interest and skills. With student expectations increasing, our most techno-wary colleagues are in an awkward position if they are not a part of changing approaches to entire course sequences and programs. Most of them will have thoughtful reasons for hesitation and their concerns should be incorporated into planning of sequence or program changes.

8. *Comprehensive assessment of learning outcomes* with multiple measures, as developed from the process in the first factor, above, where faculty identify the best uses of technology for learning in their program. This assessment must remain faculty controlled; researchers can help, but their role is supportive and should remain open to experimentation. Sometimes we can learn as much from what does not work as we can from what does work. Assessment programs should include formal and informal studies, quantitative AND qualitative measures, Classroom Research, and yes, anecdotal evidence.

9. *An Information Literacy graduation requirement* and a commitment of instructors to train their own students in using course software or web sites. If hybrid courses are going to be the best approach for most of our students (and the literature suggests it may be) then students with limited computer experience get bogged down trying to use the class website or joining an online class discussion.

Summary of Recommendations

In a perfect world, all of these enabling factors must be in place. When any are seriously lacking, development is likely to be compromised or delayed—or will it? There is hope: if one or more of these nine factors is in trouble or behind, other factors have to remain strong to offset temporary setbacks.

The most fertile ground for instructional technology growth is never in balance for long. Some seeds just don't survive; others grow without help, some needed constant tending, some die a natural death. The research team was pleased to visit two campuses where few seeds have died. @ONE played an important role in their early development, but now both colleges are developing their own resources to foster instructional technology. What is most needed at this time is on-campus training and support services that help instructors integrate technology into their disciplines in ways that promote teaching and learning.

This kind of learning can be advanced when technology champions demonstrate to colleagues in their own department how they use technology to enhance particular lessons or key concepts. As a variation on this theme, technology champions can invite their colleagues to come and observe classes. The on-campus technology support team

may be able to encourage and facilitate these informal learning communities, which could also involve students teaching instructors how to use technology to enhance particular lessons. Regional providers such as @ONE may still have a role to play in this environment. For example, they could serve as disseminators of best model practices and support development and implementation of assessment practices that campuses use to measure whether and how technology integration improves student motivation and learning.

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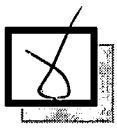

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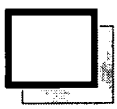

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