Designing for Uncertainty: Three Approaches[1]

by Scott Bennett

Higher education wishes to get long life and good returns on its investment in learning spaces. Doing this has become difficult because rapid changes in information technology have created fundamental uncertainties about the future in which capital investments must deliver value. Three approaches to designing for this uncertainty are described using data from recent surveys. Many of these data are related to the National Survey of Student Engagement; for another essay that employs NSSE data, see the author's "First Questions for Designing Higher Education Learning Spaces" in the January 2007 issue of the *Journal of Academic Librarianship*.

Scott Bennett is Yale University Librarian Emeritus, http://www.libraryspaceplanning.com <*scott@libraryspaceplanning.com*>.

INTRODUCTION

Throughout the millennia, human beings depended on the spoken work to communicate with one another and to build communities. Given the limited reach of the spoken word, our communities were typically small and our languages abundantly different. This has changed in only the historical blink of the last millennium. This change was powerfully advanced by four revolutions in communication technology. The first of these was movable type, introduced to Western Europe in 1450. The second was the introduction of mass-production paper, which began to roll off the Fourdrinier machine in 1807. The third change, involving recorded images and sound, was heralded by William Dickson's camera for capturing moving images invented in the Edison laboratory in 1888. The reach of this third change was immensely amplified by broadcasting technologies, which in time began with radio signals sent from atop a Westinghouse factory in 1920.

Each of these three revolutions in communication technology produced huge quantities of physical artifacts. The artifacts of the first two – printed material of all kinds – were themselves the essential instruments of change. By the 1960s, the third revolution had produced vast accumulations of recorded sound on media ranging from metal wire to plastic disks and magnetic tape. It had also produced mountains of film and videotape. Those responsible for the last generation of library buildings, in the 1960s, had to find places to put all of this physical material and could reasonably expect it to grow exponentially in the future.

This expectation was wrong. For the fourth revolution in communication technology, the digital revolution, has changed all of our calculations about space. We have even talked about getting all of the Library of Congress onto one small storage device.[2] With the marvelous march of Moore's law, that brave new world no longer seems quite the pipe dream it once did.

This fourth revolution in communication technology began changing everything for libraries in the 1960s, and the rate of change become simply breathtaking with the introduction of the World Wide Web in 1993. Who in 1992 would have predicted where we are now, a mere fifteen years later? And who will be so foolhardy as to predict where we will be in another fifteen years, in 2022?

Well, I will. I do this not because of the clarity of my crystal ball but out of simple necessity. If one's topic is investments made in renovating and building new academic library space,

one has no choice but to predict. Colleges and universities reasonably wish to secure fifty, seventy-five, or more years of value from any investment in academic space.[3] This expectation makes fifteen years a very short prospect for space design, even while it appears to be a beyond-the-horizon prospect for information technology. This intractable problem of perspective has so far yielded no clear solution except our injunction to architects to design space that is flexible. We use the word flexibility to clothe our naked uncertainty about what is coming.

Can we do better? In this essay, I want to explore three approaches to doing better, to resolving the conundrum of investing simultaneously in both the highly dynamic virtual space of information technology and the comparatively static physical space of bricks and mortar. There are many common elements in these three approaches, especially as regards their concern with student learning; but for the purposes of this paper I will emphasize the different motivations for each. I call them the service and instructional approach, the marketing approach, and the mission-based approach.

SERVICE AND INSTRUCTIONAL APPROACH

Starting in the early 1990s with the Information Arcade at the University of Iowa and the Leavey Library at the University of Southern California,[4] librarians and information technologists have joined in designing a new set of services meant to respond to the revolution – our revolution! – in information technology. This approach, often embodied in electronic classrooms and what is called the information commons, sees rapid and fundamental change in information technology as primarily a service and pedagogical problem. Students and faculty need well-equipped facilities and instructional help in mastering information technology. The information commons offers both and represents a new element in the traditional panoply of library service spaces: reference, circulation, technical services, and departmental libraries. The information commons does, however, require a fundamentally new degree of collaboration between librarians and information technologists, who bring different professional training and cultures together in newly designed spaces that support student and faculty learning. The information commons is now a well-established feature of library space design and has spawned its own professional literature and Web sites.[5]

More recently the partnership of librarians and information technologists has in some places expanded to include student tutoring staff and sometimes the staffs charged with media and audio-visual materials and with faculty development.[6] The Learning Commons at University of Guelph Library exemplifies the effort to bring librarians, information technologists, and tutoring staff together in a single service space. It was launched in the fall of 1999 and has attracted considerable attention in Canada and the United States. Further evidence of the expansion of the information commons beyond its early models also appeared in the applications for the workshops on information literacy offered by the Council of Independent Colleges, starting in 2001.

To learn more about the information or learning commons, I surveyed as many four-year institutions as I could identify that have consciously created spaces designed to bring together some combination of librarians, information technologists, student services staff, and possibly other academic support staff—all in support of student learning.[7] These staffs represent, after the faculty, a college or university's most substantial investment in the academic success of students. The survey inquires about how these staff have been brought into the same service space and how success is being defined.

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Among some 300 applicants to the CIC information literacy workshops, 67 of these small to medium sized colleges and universities appeared to have created spaces for collaboration among academic support staff. As independent institutions, they have little direct support from state or the Federal government; they typically have small endowments, are dependent financially on tuition income, and see instruction as their primary mission. Next, drawing on the work of Joanne Henning at the University of Victoria, Joan Lippincott at the Coalition for Networked Information, and the Collaborative Facilities Web site jointly maintained by CNI and Dartmouth College, I identified an additional twenty-four institutions.[8] Most of these are larger and wealthier, often public institutions; many are strongly oriented toward research. Taken together, these 91 institutions do not include every college or university to have created spaces for academic support staff collaboration, nor can these institutions be seen as a random sample. I do, however, believe this is a critical mass of institutions that vary from one another in ways typical of higher education (excluding community colleges).

I got survey responses from 66 colleges and universities, for a 73 percent rate of return. Of these, 56 institutions (90 percent) said they had indeed created collaborative facilities. A number of those completing the survey emphasized their projects are "works-in-progress" and do not yet fully represent their aspirations. One respondent captured the sense of adventure that instills these projects, saying: "the reference librarians and faculty instructional technology consultants, those most closely involved with the collaboration, have felt that it has been a very exciting and useful adventure not only in providing better service to our clients, but also in our own development."

Fig. 1 summarizes the services offered collaboratively at these 56 institutions. Fig. 2 describes the staff who provide these services. Given the high visibility of the information commons in the professional literature and the attention paid to collaboration with information technologists, it is perhaps surprising to find that student tutoring staff are involved in these collaborative facilities with a frequency approaching that of information technology staff generally.

Figure 1
Services Offered in Collaborative Facilities

Library reference	84%
Computing laboratories	84%
Instructional technology	66%
Tutoring in writing skills	63%
Faculty development	55%
Media/AV services	54%
Library circulation services	50%
Media production laboratory	45%
Classrooms	43%
Tutoring in various academic disciplines other than writing and math	32%
Tutoring in mathematics	30%
Digital products laboratory	29%

Where are these collaborative facilities being located? Some 86 percent of them are in library buildings; another 9 percent are housed in classroom and/or laboratory buildings, while the remaining 5 percent are housed in specially built buildings. Fig. 3 reports the reasons given for choosing these locations. No one reason dominates thinking about the location of these facilities; indeed, the reasons reported in Fig. 3 all reflect the advantages of locating the facilities in libraries. Location decisions are not often driven by reasons of cost efficiency.

The survey inquired about three different success factors: staff cross-training, increased spending, and changes in administrative structure. The first of these, cross-training, was required in 82 percent of the cases. Fig. 4 identifies the staff who were cross-trained and reports the kinds of cross-training that were required. These responses suggest that librarians are much more often asked to learn new substantive skills than are information technologists, student tutoring staff, or media/AV staff. Cross training in substantive skills and in service outlook is comparable in frequency. These figures may correlate with the observation often made that librarians must learn more about technology to function successfully in a collaborative work space, while information technologists must learn more about a service outlook. That the cross-training so infrequently involved pedagogical skills

is disappointing, given the absence of pedagogical training in the professional preparation of most librarians and information technologists. The relatively modest attention to pedagogy is the more to be regretted if these collaborative facilities do indeed spring from seeing rapid and fundamental changes in information technology as a pedagogical problem.

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In just over half of the cases (55 percent), collaborative facilities required increased spending to be successful. In these institutions, survey respondents reported increased spending on staff and non-staff activities as identified in Fig. 5. Strikingly, these many other institutions have been able to launch major new service initiatives while containing new costs.

Many colleges and universities have considered so-called "merged" organizations, which bring library and information technology operations into one administrative unit. Many reasons motivate such thinking, but interest in creating an information or learning commons has not often driven such

Figure 2
Staff Employed in Collaborative Facilities

Library staff	88%
Information technology staff generally	71%
Student tutoring staff	59%
Media/AV staff	52%
Information technology administrators	50%
Instructional technology staff specifically	45%
Student services staff other than tutors	36%
Faculty development staff	25%
Language Laboratory staff	11%

NOTE: The survey distinguishes among information technology staff generally, instructional technology staff, and information technology administrators. These are meaningful distinctions in many large institutions but meaningless in most small institutions, where a handful of technology staff must be generalists.

Figure 3
Reasons for the Location of the Collaborative Facility

Space was convenient for users	68%
Space was available or could be made available	66%
Space was adjacent to existing services	57%
Space was convenient for service providers	50%
Renovations were cost efficient	29%

Figure 4
Cross-training

Staff needing cross training	
Library staff	73%
Information technology staff generally	41%
Student tutoring staff	32%
Media/AV staff	32%
Instructional technology staff specifically	32%
Kinds of cross training provided	
Substantive knowledge or skills	66%
Service orientation	64%
Pedagogical skills	38%

mergers. Respondents to this survey reported that the success of their collaborative facilities required a change in formal reporting lines in only 32 percent of the cases. Among the 16 institutions reporting such changes, only 4 have chosen a "merged" library and information technology organization. Six institutions left their academic support staff in professionally distinctive operating units; in five of these cases, however, the various operating units all report to the head of one of them. Six institutions have chosen some "other" configuration for their reporting lines. New responses to revolutionary change in information technology and library services seem not to be strong motivators for change in administrative structures. Possible reasons for this (i.e., resistance to change within well established professional cultures) are not evident in the survey data.

Perhaps more telling than formal changes in administrative structure is how survey respondents described the collaboration among academic support staff. One respondent particularly emphasized this topic, saying:

> Genuine collaborations among historically distinct and physically separated student support services require immense attention, support, and nurturance. There is excellent potential for success, improvement to services, and epiphanies that lead to better outcomes for student academic success and productivity.

Figure 5
Increased Spending

Increased spending on staff	
Library staff	34%
Student services staff other than tutoring staff	20%
Media/AV staff	18%
Instructional technology staff specifically	18%
Student tutoring staff	14%
Information technology staff generally	14%
Increased spending on non-staff items	
Computer hardware and software	46%
Service space	39%
Media/AV equipment	29%
Office space	25%

Figure 6
Degree of Collaboration, Interaction, and Integration

Minimal	4%
Moderate	27%
Substantial	55%
Full	14%

Asked to characterize the degree of the collaboration among academic support staff required for success, respondents replied as indicated in Fig. 6. These data indicate how infrequently revolutionary change in information technology drives academic support staff toward "full" collaboration. While just over half of the respondents report achieving "substantial" collaboration, it is notable how frequently only "moderate" collaboration among the academic support staff is seen as compatible with success. The survey did not inquire about the terms or measures used in judging success. Some comparison of institutions reporting different degrees of collaboration would be useful, especially as regards their measures for success and their actual performance against those measures. It would for instance be instructive to know which measures of success are such as not to require "full" collaboration, and whether "full" collaboration, in the 14 percent of cases where it is achieved, yields a more powerful definition of success.

Librarians and information technologists typically conceive of themselves as members of a service profession. To collaborate in media/AV services and to bring computing, digital, and media production laboratories into the library is to act within the service ethos of their professions. To collaborate in tutoring and faculty development services and in building classroom space in the library gives these academic support staff the opportunity to expand the instructional role that is often inherent in their service activities. How far-reaching this expansion may be cannot be determined from the survey data reported here, except that the modest attention to additional pedagogical training may suggest a partial embrace of instructional roles.

In characterizing the information or learning commons, one survey respondent commented that

> the Information Commons ought to be seen, not as a unit of the library, or something separate from the library, but as the future of the academic library, and something which encompasses and transcends the traditional library, bringing together traditional print resources and the best of the electronic information resources that we are purchasing, and in an environment which includes high quality information services from librarians and instructional support professionals.

"What is distinctive in the information or learning commons is a recognition of the value of a widely collaborative approach to shaping services that help students and faculty face the uncertainties arising from rapid changes in information technology."

I think this claim overstates the transformative character of the information or learning commons. Without doubting the importance of the commons as a service innovation, I argue that it is exactly that – a *service* innovation – and fundamentally reflects the traditional concern with library space as service space. Such thinking and the space it produces spring from our convictions about how best to serve students and other readers. The strong motivation in this approach is to act on behalf of students in helpful, serviceable, and hopefully instructive ways. What is distinctive in the information or learning commons is a recognition of the value of a widely collaborative approach to shaping services that help students and faculty face the uncertainties arising from rapid changes in information technology.

So motivated, it is not surprising that this first approach to designing for uncertainty often leads to, or indeed grows out of an effort to assess the need for services and instruction. Such marketing is in fact a second approach to designing for uncertainty and is, in its motivation, a reverse image of the first. As the first approach turns primarily on ideas of information *services*, so the second approach turns primarily on the concept of readers as information *consumers*.

MARKETING APPROACH

This second approach seeks to understand the behaviors and preferences of students and to design spaces in response to their preferences. This approach is inspired by the practices of marketing and market research, and it typically regards information users as consumers.

The close interaction of the services and marketing approaches to space design is evident in the fact that the marketing approach so often starts not with student needs but rather with the needs of library staff as service providers. When the library directors who managed academic library renovation and construction projects completed between 1992 and 2001 were asked about their planning methods, they reported doing systematic assessments of library operations 85 percent of the time, compared to systematic assessments of reader or user wishes, done 64 percent of the time. Systematic assessments of the modes of student learning and faculty teaching were done much less frequently, 41 percent and 31 percent of the time respectively.[9] The wide range of marketing inquires is reflected

in a substantial professional literature that has used survey data to understand the use of digital libraries.[10] Other work investigates learning behavior more generally and learning in a digital environment specifically, while still other investigators measure learning outcomes and comment on library responses to the learning behaviors that readers favor.[11]

I illustrate the marketing approach to designing for uncertainty by describing parts of a recent online survey of student behavior and preferences conducted at a liberal arts college.[12] About 46 percent of the college's students completed the survey. Fig. 7 displays the reasons they gave for going to the main campus library. Notable in these responses is the number of reasons that rarely or never prompt two-thirds or more of this college's students to go to the main library. These include the reasons that most often motivate the design of information or learning commons: getting research and technology assistance and engaging in group study. Equally striking is that only a third of these students report having *any* reason to go to the main library frequently, and that two-thirds of these students have only three reasons for going to the main library sometimes or frequently. Two of these reasons – the use of computers and studying alone – do not intrinsically require the use of library space.

There is nothing unusual about these sobering data, which indicate an underutilization of the college's main library. They conform to widely reported patterns of use, as for instance in the Pew report "The Internet Goes to College":

> Nearly three-quarters (73 percent) of college students said they use the Internet more than the library, while only 9 percent said they use the library more than the Internet for information searching. In response to a general question about overall library use, 80 percent of college students reported using the library less than three hours each week (p. 12).

These data suggest that new investment in library space needs to be understood primarily not as a means of improving services but as a strategy for changing learning behaviors and the campus culture of learning. To get at these issues, this survey asked students about the importance to them of two specific learning behaviors: individual study and group study paired with discussions among students of course readings

Figure 7
Reasons for Going to the Library

	Modal Response	Never & Rarely	Sometimes	Frequently
Get technology assistance	**Rarely** (n=41%)	79%	18%	4%
To study with a group	**Rarely** (n=44%)	73%	24%	3%
Get research assistance	**Rarely** (n=38%)	71%	25%	4%
Socialize	**Never** (n=41%)	71%	21%	8%
Use print journals	**Rarely** (n=38%)	67%	23%	11%
View DVDs or videos	**Rarely** (n=35%)	64%	26%	11%
Use computer for courses	**Sometimes** (n=34%)	35%	34%	32%
To study alone	**Frequently** (n=35%)	30%	35%	35%
Check out a book	**Sometimes** (n=45%)	23%	45%	32%

Figure 8
Importance of Learning Behaviors

	Not Important	Somewhat Important	Important	Very Important
Study alone	1%	4%	24%	72%
Group work/discussions with students of course readings outside of class	7%	31%	40%	22%

outside of class. As Fig. 8 indicates, these students regard individual study as important or very important much more frequently (96 percent of the responses) than they do group study (62 percent).[13]

The survey inquired further about spaces used for group study. Only two locations for group study – the campus science complex and the main library – were mentioned with some frequency, as evident in Fig. 9. Asked what made the science complex so effective a space for group study, students described it as being in a convenient, central location and as offering excellent natural light, ample space, comfortable furniture, wireless connectivity, and access to food. They often described the space as tolerant of heightened levels of noise in a way library space is not. Different students preferred different levels of "noise" and "distraction." For instance, one student preferred the science complex to the library because "it's not THAT loud, but there's sort of general ambient noise, which helps me." A number of students also commented they could expect "lots of people in similar classes [in the science complex], so you can ask questions." One student offered a useful summary, expressing a preference for the science complex "because it's a central location that generally has seating and traffic – you can run into people and have a little break.... My key things: natural lighting, easy access to outside, food, foot traffic, steady availability [for study]. I haven't found ... the library that useful because it's just too quiet and I fall asleep (the ... couches are really comfortable)."

When asked about what should be included in a possible commons space in the main library, these students expressed the preferences displayed in Fig. 10. What these students most frequently "gotta have" is study space available late at night and early morning, comfortable seating, and access to food. These can surely be provided in the library, but they are not intrinsically related to library services or to services offered by information technologists and student services

staff. While approximately half of these students view such academic support services as possibly useful (i.e., "OK"), they are clearly not a priority for more than about a third of these students. In the context of this essay, what strikes one most is that the learning behaviors and preferences these students describe correspond very little with the service and instructional aspirations that typically motivate the information or learning commons. Students at this college express very little need for co-located assistance from library staff, information technologists, or tutors.

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Indeed, there is little in these responses to indicate that most students at this college make any but occasional use of the main library as a physical place. Yet when one stands near the front door of this library, one sees substantial traffic. The contradiction is more apparent than real. About a third of the students at this college report they *do* frequently study in the main campus library, check out its books, and use its computers for course work. The activities of this third of the college's students create a considerable stir and the appearance and feel of a busy library. Such a view nonetheless leaves the majority of students out of the picture. This is surely unacceptable from an educational point of view, the view – it should be remembered – that prompts librarians, information technologists, and tutoring staff to come together in collaborative facilities.

The logic of a marketing approach forces attention both to those who make frequent use of the library and to those who use it only sometimes or rarely. This logic poses fateful choices about how we will conduct planning and space design. In what measure will library space and services be designed either in response to those we already serve reasonably well or in response to those we only sometimes see in the library?

Just how untenable it is for libraries regularly to reach only one-third of those they are meant to serve, and how momentous this failure may be, is evident in *The 2003*

Figure 9
Spaces Used for Group Study

Science complex	31%
Library study rooms	22%
Other	10%
Student union café	9%
Residence rooms	9%
Residence lounges	8%
Student union	6%
Classroom buildings (other than science complex)	5%

Figure 10
Possible Features of a Library Commons Space

	"Gotta have"	"OK"	"Nah"
Extended hours	80%	17%	3%
Comfortable lounge seating	75%	22%	3%
Café	54%	29%	16%
More group study	37%	51%	12%
Tables for collaborative work	35%	53%	12%
Student academic services (writing, etc.)	31%	58%	11%
Many additional workstations	29%	53%	18%
Peer advising	20%	56%	24%
Combined technology/research help desk	19%	61%	19%

OCLC Environment Scan: Pattern Recognition. This is a report to the OCLC membership, an organization built on the belief that its services to libraries are the best means for OCLC to satisfy readers' information needs. This belief becomes unsustainable if libraries regularly reach a relatively modest percentage of the population they were created to serve at the same time that information has become an abundant rather than a scare commodity and its users express strong preferences for self-service and self-sufficiency. In an environment where students see self-directed trial and error as the preferred approach to problem solving and regard "doing" as more important than "knowing" (Oblinger, "Boomers," p. 40), the OCLC report insists that we must ask anew, "How does the library appear today through the information consumer's lens?" The answer to this question is posed as yet another question:

> Can OCLC disaggregate itself and its services in order to meet the needs of self-service consumers interested in microcontent? And how can OCLC and others link the worlds of order [i.e., the library] and chaos [i.e., the Internet], and empower the information consumer to be well-guided? OCLC members ... [i.e., libraries] value structure and mediated content. Evidence suggests that libraries' constituents do not value these elements to the same degree. Who then – which constituents – should OCLC research when building a product and service strategy?" (p. 102).

Explicitly, the 2003 OCLC report is a call for "libraries and allied organizations [to move] ... closer to information consumers at the level of *their* needs" (p. 105). Implicitly, the report foresees that OCLC will have to abandon libraries that fail to do this and join Google and others committed to remaining relevant to information consumer preferences.

For the individual college library reported on here (and I expect for many others as well), the pressing question is "who then – which constituents – should it respond to in building a product and service strategy?" Should this main campus library continue to serve only about a third of the institution's students with any frequency? Or should it adopt a strategy that moves the library closer to the needs of the remaining two-thirds of the college's students? And is this an either/or choice for the library, or a both/and choice? Is there still another approach to designing for the uncertainties of our increasingly digital environment?

MISSION-BASED APPROACH

In driving to its conclusion, the 2003 OCLC report is explicit in regarding information users as consumers, even in the chapter on "The Research and Learning Landscape." This view is also implicit in many of the survey questions we commonly ask—such as that about what students "gotta have" in a library commons space. Indeed, it is a view that students often take of themselves, as evident in one student's comment on study space: "My key things: natural lighting, easy access to outside, food, foot traffic, steady availability [for study]." But in this last phrase, and in much else in our surveys and the professional literature, there remains some instinct to identify students as learners more than as information consumers. One might seize on this in shaping an approach to design that insists, as its point of departure, that students are before all else learners and that library space design should be primarily concerned not with services but with learning.

Such a design practice would focus first upon ends, not means—on institutional mission rather than academic services. Such a design practice would constitute a third approach to designing for uncertainty, motivated not by the professional intentions of academic support staff or by the behaviors and preferences of information consumers, but by the institutional mission that brings students, faculty, and academic staff together in the first place. This approach could identify specific learning behaviors that students and faculty say are important and design spaces that foster such of these behaviors as advance the educational mission of the college or university. The emphasis here is on institutional mission. In this context, it is important to document learning behaviors important to students and faculty only as a step toward enabling the institution to determine whether it also identifies these behaviors as crucial to fulfilling its mission. Where that is the case, the institution will presumably feel a strong motivation to invest in space designed to foster the learning behavior in question.

To help focus design on institutional mission, I have developed a pair of surveys asking about twelve specific learning behaviors that figure in educational practices known to be effective and drawn largely from the National Survey of Student Engagement. These are largely behaviors of active, engaged learning; they are primarily initiated by students; and

they occur principally outside of the classroom.[14] Focusing on these behaviors has a three-fold rationale:

- It is commonly observed that much of collegiate learning happens outside of the classroom and that learning is most effective when students are actively engaged in it.

- Colleges and universities make sizable capital investments in campus spaces other than classrooms; these spaces should be significant assets supporting the teaching and learning mission of each institution.

- Learning outside of the classroom sometimes involves librarians, information technologists, and student support staff. After the faculty, these staff represent an institution's most significant investment in people committed to the academic success of students.

Ten of the twelve learning behaviors about which my surveys ask are elements of two NSSE benchmarks of effective educational practice. Each of the ten is here followed by the abbreviation used by NSSE in 2004 to identify the individual learning behavior.

Active and collaborative learning benchmark:

1. Students work with classmates outside of class to prepare class assignments [OCCGRP];

2. Students discuss ideas from readings or classes with others outside of class (students, family members, co-workers, etc.) [OCCIDEAS];

3. Students discuss ideas from readings or classes with faculty members outside of class [FACIDEAS];

4. Students work with faculty members on activities other than coursework (committees, orientation, student life activities, etc.) [FACOTHER];

5. Students work on a research project with a faculty member outside of course or program requirements [RESRCH04];

Enriching educational experiences benchmark

6. Students have serious conversations with students who are very different from themselves in terms of their religious beliefs, political opinions, or personal values [DIFFSTU2];

7. Students have serious conversations with students of a race or ethnicity different from their own [DIVRSTUD];

8. Students pursue independent study or a self-designed major [INDSTD04];

9. Students have a culminating senior experience (comprehensive exam, capstone course, thesis, project, etc.) [SNRX04];

10. Students participate in a learning community or some other formal program where groups of students take two or more classes together [LRNCOM04].

The surveys also ask about two learning behaviors not drawn from NSSE. These are studying alone and studying as an individual but in the presence of others who are also studying.

My surveys ask students and faculty respondents to say which of these learning behaviors are important or very important to them; to indicate (if a given learning behavior is important to them) whether their campus provides space that fosters the behavior; and to identify that space. I report here on what can be learned at one liberal arts college (not the same one as considered in the previous section of this paper) from such an inquiry.[15] At this college, both student and faculty respondents to the surveys were self-selecting, rather than randomly selected. About 11 percent of the college's students and 61 percent of the faculty responded to the survey.

Learning Behaviors Identified As Important

About half or more of the students and faculty at this college identified six of the ten NSSE learning behaviors listed above as important or very important to them, as indicated in Fig. 11.[16] Students and faculty agreed on the importance of discussions of

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Figure 11
Learning Behaviors Identified as Important/Very Important

Student responses	
Conversations with students with different values [DIFFSTU2]	75%
Discussions of readings outside of class [OCCIDEAS]	66%
Conversations with students of different race [DIVSTUD]	62%
Group study [OCCGRP]	60%
Discussions of readings with faculty outside of class [FACIDEAS]	49%
Culminating senior experiences [SNRX04]	49%
Faculty responses	
Conversations with students with different values [DIFFSTU2]	76%
Discussions of readings outside of class [OCCIDEAS]	74%
Conversations with students of different race [DIVSTUD]	71%
Discussions of readings with faculty outside of class [FACIDEAS]	66%
Culminating senior experiences [SNRX04]	62%
Group study [OCCGRP]	42%

readings outside of class [OCCIDEAS], conversations with students who have very different personal values [DIFFSTU2], and conversations with students who differ in race [DIVSTUD]. A higher percentage of faculty than student respondents rate the first [OCCIDEAS] and third [DIVSTUD] of these behaviors as important or very important.[17] If this college, as an institution, wishes to foster these behaviors as a matter of educational mission, it might well ask whether the experience and exploration of diversity is something that benefits from distinctive space design and whether space of this character is readily available on campus. If not, can such space be created?

Students and faculty disagree on the remaining three learning behaviors. Here again, the college might well determine how these behaviors bear on its educational mission and decide whether space designed to foster any of these behaviors would help strengthen the institution. In effect, the college would consider whether it could improve its education practice by acting to reduce student/faculty disagreements about learning behaviors that are important to the mission of the college. In the present case:

• Students regard group study [OCCGRP] as *much more important* than do faculty. This is a common disparity but one that a college might wish to reduce, given the critical importance of study time to learning. Most undergraduates fall far short of the view advanced by faculty nation-wide that students need to study at least twenty-five hours a week to do well in college.[18] Surely many factors contribute to students' general failure to meet faculty expectations regarding time-on-task, but decisions about encouraging group study and providing congenial group study space are likely to be among them. Colleges and universities invest heavily in creating campus environments, and arguably these investments are underperforming if they do not demonstrably foster learning behaviors that students themselves value and that might lead students to spend more time studying.

• Faculty respondents, *much more often* than students, regard faculty-student discussions of class material outside of the classroom [FACIDEAS] as important or very important. It appears from the survey that these discussions occur most frequently in the dinning hall and the student union (probably encouraged by the availability of food), commons spaces in academic buildings, outdoors, and in faculty offices. If a college wanted to make these conversations more important *to students*, it might consider a more intentional use of food and of space providing food as a means of encouraging them.[19]

• Faculty respondents, *much more often* than students, regard culminating senior experiences [SNRX04] as important or very important. Survey data suggest that this learning behavior occurs in many different campus spaces. If a college wanted to make capstone experiences more important *to students*, it might consider giving these activities more distinctive spatial identity and celebrating them more often and more intentionally (e.g., a gathering place for honors students, and spaces for the frequent exhibit, presentation, and performance of capstone work).

Campus Spaces Supporting Important Learning Behaviors

When asked whether the college provides space that actually fosters the six learning behaviors identified as important, students and faculty responded as reported in Fig. 12. In only two cases (discussions of readings with faculty outside of class [FACIDEAS] and culminating senior experiences [SNRX04]) did more than two-thirds of students and faculty respondents feel the college provides space that adequately fosters learning behaviors important to them. Notably, these two learning behaviors are important to only half of students. For the remaining learning behaviors, campus spaces are arguably under-performing for approximately 40 percent to 60 percent of students and approximately 40 percent to 80 percent of faculty.

The surveys sometime yield ambiguous results. In the case of this college, for instance, among the 60 percent of student respondents who identify group study [OCCGRP] as important or very important to them, 62 percent believe the campus provides space that supports this behavior adequately or very well. Against this positive picture stand eight of the eighteen general comments made by students on the survey, including:

• Group study is important and vital to my success in a few particular classes. . . . It would be nice if there were places

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Figure 12
Frequency with which Students and Faculty Think Campus Space Fosters Learning Behaviors Adequately/Very Well

Student responses	
Discussions of readings with faculty outside of class [FACIDEAS]	87%
Culminating senior experiences [SNRX04]	74%
Group study [OCCGRP]	62%
Discussions of readings outside of class [OCCIDEAS]	54%
Conversations with students with different values [DIFFSTU2]	52%
Conversations with students of different race [DIVSTUD]	40%
Faculty responses	
Discussions of readings with faculty outside of class [FACIDEAS]	79%
Culminating senior experiences [SNRX04]	61%
Discussions of readings outside of class [OCCIDEAS]	46%
Conversations with students with different values [DIFFSTU2]	45%
Group study [OCCGRP]	38%
Conversations with students of different race [DIVSTUD]	22%

available twenty-four hours a day for students to meet and study together.

- We need somewhere to study with groups of people besides in the lobbies of the dorms. It becomes very noisy and distracting to see people come and go while trying to study. The current library does not appeal to group studying.

- I think to have more space to have big study sessions is important and a way to incorporate more diversity among students.

- At the present moment I feel like I have to go off campus to find a nice environment to study.

These comments presumably reflect the views of the 40 percent of student respondents who value group study but do not feel that campus space supports such study adequately. These comments find an echo among faculty respondents to the survey. Only 42 percent of faculty respondents regard group study as important or very important, but among these faculty, only 38 percent (compared to 62 percent of student respondents) believe the campus provides spaces that support group study adequately or very well. One faculty respondent commented that

- Common areas such as a student complex with spaces to interact, drink coffee, study, or meet with other students are quite limited. Library common space is very limited as well.

Identification of Supportive Learning Spaces

Only those students and faculty who believe campus spaces foster well the learning behaviors important to them were asked to identify, from a list, the specific spaces they feel support learning. Fig. 13 identifies these spaces and employs the χ^2, or chi-square, statistical test to understand the significance of the results. The survey identified eight different kinds of campus space. The number of times students or faculty identified each of these spaces was totaled, producing a distribution of observed values (f). This distribution was compared to an average

distribution of values (F) to determine whether (at a 95 percent level of confidence) the observed distribution is significantly different from an average one, which – arguably – could not usefully guide design decisions. The observed distributions for both students and faculty are in fact significantly different, as evident in the fact that the value of χ^2 for both student and faculty responses exceeds the value of the critical region noted for each.

Fig. 13 also displays the individual $(f-F)^2/F$ calculations, from which the value of χ^2 is determined, for each of the eight spaces. This display helps to identify which of the eight spaces contribute most significantly to the value of χ^2, through either positive or negative variance from an average distribution. In this analysis, the positive or negative direction of the variance from an average distribution is noted for any value of $(f-F)^2/F$ exceeding 2.0. As one might predict, neither students nor faculty see recreational and intramural sports facilities as fostering learning behaviors. This finding functions as a reality check for the rest of the analysis. Other statistically significant findings are that:

- Student scores differ quite markedly from an average distribution. Students identify the residence halls as fostering effective learning behaviors *slightly more often* than would be expected in an average distribution of scores, while they identify commons spaces in academic buildings *much more often*—even more frequently than the library. Notably, students identify campus computing laboratories as fostering effective learning behaviors *much less often* than would be expected in an average distribution of scores.

- Faculty scores more closely approach an average distribution. Faculty identify only the dinning halls as fostering effective learning behaviors *slightly more often* than would be expected in an average distribution of scores.

- There is *no overlap* in the spaces that either students or faculty identify as effective learning spaces more often than would be expected in an average distribution of scores. Students and faculty see campus learning spaces quite differently.

Figure 13
Non-classroom Campus Spaces Identified as Fostering Effective Learning Behaviors

	x^2	Critical region x^2; df = 7	Residence halls	Dinning halls	Student union	Commons spaces in academic buildings	Recreational & intramural sports facilities	Outdoor spaces	Libraries	Computing laboratories
						$(f-F)^2/F$				
Students	73.762	≥14.067	**2.227**	0.068	1.354	**10.526**	**42.284**	1.621	**6.694**	**8.988**
			+ variation			+ variation	- variation		+ variation	- variation
Faculty	24.344	≥14.067	0.002	**2.944**	1.951	1.530	**14.982**	1.530	0.702	0.702
				+ variation			- variation			

Fig. 13 tells us a good deal about *student* views of their learning spaces.

- Students identify commons spaces in academic buildings and the library as effective learning spaces much more frequently than their own residences. This corresponds with the well-recognized problematic nature of residence halls as learning spaces.

- Students most frequently identify commons spaces in academic buildings as effective learning space. This is notable because of the relative paucity of such spaces on this campus (and on many other others). One might hypothesize that these ''non-proprietary'' spaces are particularly attractive to students because of the ease with which they can be temporarily appropriated by students.[20]

- It is to be regretted that the library scores so much lower than commons spaces in academic buildings, especially given the relative paucity of the latter. It is still more to be regretted that students do not frequently identify the student union as an effective learning space, given the amount of space in the student union that could function in this way. Understanding the design differences between poorly performing library and student union space and the strongly performing commons spaces in academic buildings might be important for effecting change.

- It is to be regretted that campus computer laboratories are so infrequently identified as effective learning spaces. This result is contrary to the usual preference of students that computers be part of their study environment.

DESIGNING WITH CONFIDENCE

Let us return to our point of departure and see where we are. The problem with which this essay began is the need for higher education to get long life and good returns on its investment in physical space. In recent years, this has become even more important at the same time that it has become more difficult.

> "Over the coming years, colleges and universities with programs built–literally built!–for residential students will increasingly compete with institutions offering online instruction and able thereby to minimize their investment in physical plant. In a competitive environment where an institution's campus is often its largest financial asset, the campus and its learning spaces will be either a principal asset or a chief liability."

One reason our institutions must attend even more than in the past to their return on capital investments is that they are now challenged, competitively, by institutions that are largely unburdened by the costs of a campus. Over the coming years, colleges and universities with programs built – literally built! – for residential students will increasingly compete with institutions offering online instruction and able thereby to minimize their investment in physical plant. In a competitive environment where an institution's campus is often its largest financial asset, the campus and its learning spaces will be either a principal asset or a chief liability.

While these forces are at work generally in higher education, those of us specifically concerned with academic libraries face daunting uncertainties about securing reasonable value over the fifty or seventy-five year life span expected of academic buildings. These uncertainties are of recent date. For most of the twentieth-century, the principal rationale for library space was to house burgeoning collections of paper and other physical objects. As recently as the 1990s, the most common motivation for new investments in library space was the need to accommodate growing collections. But many of those responsible for library projects in the 1990s expressed the hope that shelving needs would never again drive library space design in the way it had in the past (*Libraries Designed for Learning*, pp. 6–13). This hope builds on the promise of using virtual space to reduce the demand for physical space and is exemplified by JSTOR, now a major source of online journals. Quite literally, JSTOR was born in the 1993 discussions of the Board of Trustees at Denison University regarding overcrowded book stacks.[21]

The promise of digital space as a substitute for physical space gives welcome new scope to thinking about how library space might in the twenty-first century be used to foster learning. Those responsible for library projects in the 1990s said that the second strongest motivator for their projects, after accommodating growing collections, was the changing character of students' study space needs (*Libraries Designed for Learning*, pp. 6, 16–20). But while technology has freed us in thinking about library space to focus anew on student learning, it has also drawn much of learning out of both the classroom and the library.[22] There are today no certainties about learning, comparable to our past certainties about the grown of physical collections, that may be invoked to guide the design of library space.[23]

I have sketched here three different approaches to designing for the uncertainties we face in thinking about library space. They overlap considerably in their concern for library and other instructional services, for individual and group study, and for the provision of computers and technology support. While these three approaches have much in common, they differ most from one another in the thinking that motivates them and in their potential for yielding space likely to have enduring value for colleges and universities.

As regards motivation, the service and instructional approach springs from the convictions of librarians, information technologists, and student services staff about what would benefit students. The marketing approach turns this around, and asks students themselves what would be useful to them. The mission-based approach, by contrast, focuses first on institutional mission and only second on academic support staff and students. It builds on specific learning behaviors that students and faculty say are important and points to investment in spaces that foster such of these behaviors as advance the college or university's educational mission.

As regards enduring value, investments driven by the service and instructional approach are likely to have the shortest productive half-life, given rapid changes in our service and instructional environments. For instance, building a substantial reference desk now runs counter to marked declines in reference inquires and the possibility of moving reference and instructional services into virtual space and into the physical spaces of information users.[24] Investments driven by the wishes of students conceived of as information consumers are liable to the same volatility, while investments driven by students' preferences among study behaviors may have a longer productive half-life, especially if one believes that student preferences will track the slow-moving paradigm shift in higher education away from faculty-centered to learner-centered practices.[25] Investments driven by attention to learning behaviors that advance an institution's mission are likely to have the longest productive half-life, given the stability of institutional mission when compared to rapid changes in technology. Such mission-based investments also have some potential for affecting the direction and pace on an individual campus of the paradigm shift toward learner-centered education.

This view of a mission-based design of learning spaces is strongly argued by Project Kaleidoscope and its Director, Jeanne Narum. For more than a decade, PKAL has been identifying best practices in the teaching and learning of science, technology, engineering, and mathematics. This focus has prompted a strong interest in the design of learning spaces. Narum observes that

> Too often, planning for new spaces for undergraduate teaching in science and mathematics begins with the wrong questions. Sometimes the initial mis-step occurs when faculty say "we do not have enough space—we need more room for faculty, for students, for equipment." Questions about size – "How many square feet per faculty member, per major, per department do you need?" – often surface in response to such demands…. These are important questions; they need to be addressed. However when they shape the initial stages of planning, the process is skewed. You will not end up with the building that you need, that your students deserve.

If these questions are the wrong questions with which to begin, what are the right ones? Narum argues that

> Discovering the right first questions happens when … faculty focus on student learning – what actually is to happen in the classroom and lab, about the kind of learning that is encouraged as students work together, and have hands-on involvement with physics, or another of the sciences. 'First' questions arise when faculty begin to think about what happens when students have their own spaces for investigative research, when labs accommodate student teams wrestling with questions to which answers are not known, when students have the opportunity to use state-of-the-art instrumentation to do science.

Narum concludes:

> Questions about the nature of the educational experience – about quality and the nature of the learning community – are questions that must be asked first and asked persistently throughout the process, and indeed before and beyond the process of planning a facility.[26]

If these are the right first questions for the design of science facilities, what are the right first questions for the design of library space as learning space? They are most unlikely to be about services that can and should increasingly be delivered in virtual space or in spaces outside the library building. They are unlikely to be questions that conceive of students as information consumers or as consumers of instructional services. The right first questions are those that ask about student learning and the quality and nature of the community in which students – and all the rest of us – learn. The right first questions are most fundamentally about the learning behaviors that give life to the educational missions of the institutions that bring us together physically and, in doing that, create quite wonderful places – called campuses – in which our learning behaviors and the institutional missions they reflect may flourish. By getting our first questions right and thinking first and persistently about student learning and institutional mission, we will be able to address the many uncertainties of planning with a confidence that we will create the learning spaces our colleges and universities need and our students deserve.

APPENDIX A

Collaborative Facilities Survey Instrument

Name of your college or university:

1. What name(s) have you used for your collaborative project(s)?

    ○ Information Commons

    ○ Learning Commons

    ○ Other (please specify)

    ○ Other (please specify)

    ○ Other (please specify)

    ○ Other (please specify)

2. Does your project seek advantage from having academic staff trained in a variety of service disciplines working collaboratively with one another?

    ○ Yes

    ○ No [If no, end of questionnaire]

3. For your project(s), what *services or facilities* were or will be involved?

    ○ Library reference service

    ○ Library circulation service

    ○ Computer laboratory

    ○ Instructional technology

    ○ Digital asset management

    ○ Digital projects laboratory

    ○ Media/AV facility

    ○ Media production laboratory

○ Student tutoring services for writing

○ Student tutoring services for mathematics

○ Student tutoring services for other academic disciplines

○ Language laboratory

○ Faculty development activities regarding teaching and learning

○ Classrooms

○ Offices for faculty in various academic disciplines

○ Other services or facilities (please specify)

4. For your project(s), what *academic support staff* were or will be involved?

○ Library staff

○ Student services tutoring staff

○ Other student services staff

○ Student services administrators

○ Media/AV staff

○ Information technology staff generally

○ Educational technology staff specifically

○ Information technology administrators

○ Language instruction staff

○ Faculty development staff

○ Other academic support staff (please specify)

5. To ensure the success of your project(s), what degree of collaboration/interaction/integration among the relevant staffs is or will be necessary?

○ Minimal collaboration/interaction/integration

○ Moderate collaboration/interaction/integration

○ Substantial collaboration/interaction/integration

○ Full collaboration/interaction/integration

○ Other (please specify)

6. To ensure the success of your project(s), was or will it be necessary to cross-train the staff involved or otherwise enhance their previous professional preparation?

○ Yes

○ No

6A. [If Yes to 6] Please check the staff that were or will be cross-trained or have their professional preparation enhanced:

○ Library staff

○ Student services tutoring staff

○ Other student services staff

○ Student services administrators

○ Media/AV staff

○ Information technology staff generally

○ Educational technology staff specifically

○ Language instruction staff

○ Faculty development staff

○ Other academic support staff (please specify)

6B. [If Yes to 6] Please check the kind(s) of cross-training and enhanced preparation that is required for the success of your project(s):

○ Technical and substantive information/skills

○ Pedagogical skills

○ Service outlook

○ Other (please specify)

7. To ensure the success of your project(s), was or will it be necessary to increase the number of staff involved?

○ Yes

○ No

7A. [If Yes to 7] Please check the type of staff which has been or will be increased:

○ Library staff

○ Student services tutoring staff

○ Other student services staff

○ Student services administrators

○ Media/AV staff

○ Information technology staff generally

○ Educational technology staff specifically

○ Language instruction staff

○ Faculty development staff

○ Other academic support staff (please specify)

8. To ensure the success of your project(s), was or will it be necessary to increase spending significantly on something other than staff?

○ Yes

○ No

8A. [If Yes to 8] Please check the type of increased spending needed:

○ Service space

○ Office space for staff

○ Computer hardware and software

○ Media/AV equipment

○ Other equipment

○ Other (please specify)

9. To ensure the success of your project(s), was or will it be necessary to change administrative reporting lines?

○ Yes

○ No

9A. [If Yes to 9] Please check the type of change in administrative reporting lines involved in your project:

○ Library, information technology, student services, and other academic support staff remain in professionally distinct administrative units and report differently within the college or university administrative structure

○ Library, information technology, student services, and other academic support staff remain in professionally distinct administrative units but report to the head of one of these units (e.g., the head of information technology)

○ Library, information technology, student services, and other academic support staff work not in distinct administrative units but in a "merged" organization employing a variety of professional skills

○ Other (please specify)

10. Please indicate the location(s) of your project(s), checking as many of the following as may be pertinent:

○ Library building

○ Classroom/teaching laboratory building

○ Student union

○ Academic services building

○ Administrative building

○ Specially built building

○ Other (please specify)

11. Please indicate the reason(s) that guided the choice of location for your project(s) by checking as many of the following as were significant considerations:

○ Space was or could be made available

○ Required renovations were cost efficient

○ Adjacent to related services already in place

○ Convenient location for service users

○ Convenient location for service providers

○ Other (please specify)

Notes and References

1. ©Scott Bennett, 2006. Readers of this paper and librarians may copy it without the copyright owner's permission, if the author and publisher are acknowledged in the copy and the copy is used for educational, not-for-profit purposes. A version of this paper was first presented at "Towards a Learning Ecology: Canadian Learning Commons Conference [June] 2006" at the University of Guelph. For more information about the conference, see http://www.learningcommons.ca (20 July 2006).

2. See, for instance, Kevin Kelly, "Scan This Book!" *New York Times*, 14 May 2006; Section 6, Column 3, p. 43.

3. See Phillip D. Long and Stephen C. Ehrmann, "Future of the Learning Space: Breaking Out of the Box," *EDUCAUSE review* 40 (July/August 2005): 56, available: http://www.educause.edu/apps/er/erm05/erm054.asp (20 July 2006).

4. For the University of Iowa Information Arcade, see Carol Ann Hughes, "'Facework': A New Role for the Next Generation of Library-Based Information Technology Centers," *Library Hi Tech*. 16, no. 3–4 (1998): 27–35; and for the Leavey Library, see Deborah Holmes-Wong, Marianne Afifi, Shahla Bahavar, and Xiogang Liu, "If You Build It, They Will Come: Spaces, Values, and Services in the Digital Era," *Library Administration and Management* 11 (1997): 74–85.

5. A good entry point to this literature is the Web site, "Information Commons: A Directory of Innovative Services and Resources in Academic Libraries." Available: http://www.brookdale.cc.nj.us/library/infocommons/ic_home.html (20 July 2006).

6. One indicator of the timing of this change is the absence of any mention of student support staff as offering an opportunity for "strategic alignment" in Donald Beagle, "Conceptualizing an Information Commons," *Journal of Academic Librarianship* 25 (March 1999): 82–89.

7. The survey instrument appears in Appendix 1.

8. See http://jhenning.law.uvic.ca (20 July 2006); for the CNI/Dartmouth Web site, see http://www.dartmouth.edu/~collab/ (20 July 2006).

9. Scott Bennett, *Libraries Designed for Learning* (Washington, DC: Council on Library and Information Resources, 2003); pp. 20–22, available: http://www.clir.org/pubs/abstract/pub122abst.html (20 July 2006).

10. See, for instance, Amy Friedlander, *Dimensions and Use of the Scholarly Information Environment: Introduction to a Data Set Assembled by the Digital Library Federation and Outsell, Inc.* (Washington, DC: Council on Library and Information Resources, 2002), available: http://www.clir.org/pubs/abstract/pub110abst.html (20 July 2006); Carol Tenopir, *Use and Users*

of Electronic Library Resources: An Overview and Analysis of Recent Research Studies (Washington, DC: Council on Library and Information Resources, 2003), available: http://www.clir.org/pubs/abstract/pub120abst.html (20 July 2006); and Cathy De Rosa, *The 2003 OCLC Environmental Scan: Pattern Recognition. A Report to the OCLC Membership* (Dublin, OH: OCLC, 2004).

11. See, for instance, *How People Learn: Brain, Mind, Experience, and School*, ed. John D. Bransford, Ann L. Brown, and Rodney R. Cocking (Washington, D.C.: National Academy Press, 1999); Kenneth A. Bruffee, *Collaborative Learning: Higher Education, Interdependence, and the Authority of Knowledge*, 2nd ed. (Baltimore: Johns Hopkins University Press, 1999); John Seely Brown, "Learning in the Digital Age," in *The Internet and the University: 2001 Forum*, edited by Maureen Devlin, Richard Larson and Joel Meyerson (Boulder, CO: EDUCAUSE. 2002), pp. 65–91, available: http://www.educause.edu/LibraryDetailPage/666?ID=PUB5007 (20 July 2006); Diana Oblinger, "Boomers, Gen-Exers, and Millennials: Understanding the New Students," *EDUCAUSE review* 38 (July/August, 2003): 36–43, available: http://www.educause.edu/ir/library/pdf/erm0342.pdf (20 July 2006); Joan K. Lippincott, "Net Generation Students and Libraries," *EDUCAUSE review* 40 (March/April 2005): 56–66, available: http://www.educause.edu/er/erm05/erm0523.asp (20 July 2006); Steve Jones, "The Internet Goes to College: How students are living in the future with today's technology," a publication of the Pew Internet & American Life Project, September 2002, available: http://www.pewinternet.org/PPF/r/71/report_display.asp (20 July 2006); George D. Kuh and Robert M. Gonyea, "The Role of the Academic Library in Promoting Student Engagement in Learning," *College and Research Libraries* 64 (July 2003): 256–282; and the National Survey of Student Engagement and the Faculty Survey of Student Engagement, both available at http://nsse.iub.edu/index.cfm (20 July 2006). For an extended consideration of how NSSE and FSSE data might be used in planning learning spaces, see Scott Bennett, "First Questions for Designing Higher Education Learning Spaces," published in the January 2007 issue of the *Journal of Academic Librarianship*.

12. The library that conducted this survey granted me permission to use its data on the condition that they be presented anonymously. The view taken here of this survey data is my own and does not necessarily reflect the views of the institution where the data were collected. The data on library usage relate to the main campus library only and do not reflect the use of discipline-specific branch libraries. The library's survey addressed issues beyond those discussed in this essay.

13. NSSE data for this college would confirm or contradict this observation. FSSE data for the college would reveal any disparities between the importance that students and faculty attach to group study. It is often the case that faculty regard group study as less important than do students and no doubt shape their assignments accordingly. One student services officer observed in informal conversation that she was not surprised by the high importance students attach to individual study. Such views reflect how they have been taught to be learners and what they are most frequently asked to do as learners.

14. The surveys are available: http://express.perseus.com/perseus/surveys/1734848031/14f92090.htm (the student survey; 20 July 2006), http://express.perseus.com/perseus/surveys/1734848031/4ad72d78.htm (the faculty survey; 20 July 2006), and available under the Current Projects tab of my Web sites http://www.libraryspaceplanning.com (20 July 2006).

15. The college that conducted these surveys granted me permission to use the data on the condition that they be presented anonymously. The view taken here of this survey data is my own and does not necessarily reflect the views of the institution where the data were collected.

16. Questions about the two learning behaviors not drawn from NSSE were not part of the survey instruments when they were used at the college reported on here.

17. Because the learning behaviors used in this inquiry come from the National Survey of Student Engagement, it is possible to consider responses to this survey about learning space in the context of national surveys of both student (NSSE) and faculty (FSSE) views. This college does not consistently lead or lag behind on any of the learning behaviors asked about in this survey, except that it lags on conversations with students who are very different in personal values [DIFFSTU2] and conversations with students of different race [DIVRSTUD].

18. *Student Engagement. Pathways to Collegiate Success. 2004 Annual [NSSE] Survey Results* (Bloomington, IN: National Survey of Student Engagement) p. 13, available: http://nsse.iub.edu/html/report-2004.cfm (20 July 2006).

19. Food is a great social equalizer. For an extended discussion of the difficulty of encouraging study/faculty exchanges outside of the classroom, see Bennett, "First Questions."

20. Students' favorable comments about the science complex at the college discussed in the previous section of this essay reinforce this view.

21. Roger C. Schonfeld, *JSTOR. A History* (Princeton, NJ: Princeton University Press, 2003) p. 1.

22. See Malcolm B. Brown and Joan K. Lippincott, "Learning Spaces: More than Meets the Eye," *EDUCAUSE Quarterly*, 38, no. 1 (2003); 14–16, available: http://www.educause.edu/ir/library/pdf/eqm0312.pdf (20 July 2006).

23. The architect Craig Hartman argues that "while there is a long tradition to draw on, there is no agreed-on paradigm for the library of the future. Getting to this paradigm is the task before us," in "Memory Palace, Place of Refuge, Coney Island of the Mind: The Evolving Roles of the Library in the Late 20th Century," *Research Strategies* 17 (2000): 107–121.

24. For a striking example of the latter, see "Welsh Medical Library [at Johns Hopkins University] Architectural Study," available at: http://cfweb.welch.jhmi.edu/welchweb/architecturalstudy/index.html (20 July 2006). See also Kathleen Burr Oliver, "The Johns Hopkins Welch Medical Library as Base: Information Professionals Working in Library User Environments" in *Library as Place*, pp. 66–75.

25. For a much-cited description of this paradigm shift, see Robert B. Barr and John Tagg, "From Teaching to Learning—A New Paradigm for Undergraduate Education," *Change* 27 (November/December 1995): 12–25.

26. "Building Communities: Asking the Right Questions." Available at: http://www.pkal.org/documents/BuildingCommunitiesAskingTheRightQuestions.cfm (20 July 2006).