Learning, Engagement and Technology
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Introduction

This chapter focuses on new ways of thinking about promoting information literacy, engaging students, and building community in technology-enabled environments, both physical and virtual. Whether or not a campus has a formal "learning communities" program, libraries can play a role in enhancing community development in the context of teaching, learning, and information literacy. The chapter will discuss some innovative current practices, and explore two arenas with as yet unrealized potential for uniting technology use, social learning and student engagement: virtual spaces such as simulated environments and virtual worlds; and new types of physical, technology-enabled learning spaces.

Learning Communities

Many researchers who have studied the nature of learning have concluded that a social process involving interaction with and observation of others, is an important component of learning. In the 1960s, some pioneers in higher education developed a movement to establish learning communities within colleges and universities to combat the isolation of students in their academic lives and intentionally to create an environment where students engaged each other and their faculty in sustained conversations about academic subjects. Typically, students in this established learning community model take a group of courses together so that they get to know each other and feel comfortable interacting with their peers. In addition, this learning community model sometimes includes a residential component in which students live together in the same dormitory as well as take a group of courses together. In some cases, these learning communities are limited to freshman year experiences; in other cases, they extend into later years of students' campus experiences.[i]

New Learning Communities

As the learning communities movement developed, it focused on in-person, social interaction in the context of curriculum and was disconnected from the increasing use of technology on campuses. In fact, in the early years of use of the Internet on campuses, technology was often thought to isolate students, rather than build community, and there did not seem to be an obvious link between learning communities and technology. However, some faculty,

librarians, and information technologists understood the potential for incorporating technology into the curriculum in a way that would enhance community, rather than isolate students. In 1994, the Coalition for Networked Information, with its partners, the Association for Research Libraries and Educom, initiated a program called New Learning Communities <http://www.cni.org/projects/nlc/>, which brought together pioneering teams of institutional partners who were developing programs emphasizing learning, community-building, and use of technology. While the types of programs being developed were not necessarily learning communities in the traditional sense (a common set of courses coupled with residential community) the programs selected to participate in the 1995 and 1997 New Learning Communities workshops sought to increase interaction among students and between students and faculty through the use of technology in the curriculum.[ii] An example of one program that was part of the New Learning Communities initiative was the Freshman Interest Group program of the University of Washington's UWired program <http://www.washington.edu/uwired/>. This program combined a small group freshman experience, incorporation of information literacy into the curriculum, and the design of new, collaborative spaces that featured group use of technology.

Net Gen Students
While the UWired program and others provided an innovative connection between technology and the curriculum, in the early and mid-1990s most students used technology on the periphery of their education, writing papers using word processing software, searching online catalogs and databases, and exchanging e-mail, but not "living" online. However, by 2000, when the Net Gen students (students born between 1982-1991) arrived on campus, the manner in which many students perceived and used technology had dramatically changed.[iii] Today's students do not see use of technology as something separate or special; cell phones, desktop computers, laptops, PDAs, and IPods or similar devices, are part of their lifestyle and culture. Many students use these technologies in a social, community-building way — for example, moving easily between talking with friends in a café while instant messaging others who are not physically present and including them in the conversation. However, innovative use of community-building technologies within the curriculum is still not the norm. Faculty and librarians primarily use technology in the curriculum to post information, to present Powerpoint™ slides in a lecture or lecture-discussion format in class, and to conduct e-mail exchanges. These are static, limited information-delivery functions or one-to-one communications, for the most part.

Information Literacy
Within higher education, librarians have been relatively early adopters of technology. Even before the Internet was widely used in libraries, information literacy programs in the mid-1980s began to incorporate the use of computer technology into the objectives taught in class sessions. Librarians began to teach students to search databases on their own (previously librarians had

searched databases for their users) and to use online catalogs. The databases were either accessed via computer modem, often with per minute charges attached, or via CD-ROM, which usually meant simultaneous access was limited to a very small number of users. Today, librarians still emphasize the searching process in their information literacy sessions, widening the focus to databases and other resources licensed or owned by the library as well as resources available in the broader Internet.   Other topics in information literacy education include evaluating information, managing research information effectively, and understanding its ethical use.

While librarians develop information literacy programs that interact with specific courses, their role in the class is generally that of guest lecturer and the librarian is not seen as a member of the class's "community." Some students may take the initiative to contact the librarian who instructed them after the class as they work on their assignments, but usually students are advised that they can consult with any librarian and do not need to seek out the one who met with their class. In emphasizing efficiency, librarians may be losing an opportunity to build a sense of community within the course. In addition, librarians usually teach students to search for information with the implicit assumption that searching is an individual, not a group process, pairing students only if there are not enough computers for each student to have an individual workstation. There is little emphasis or encouragement of the kind of peer consultation that today's students frequently use to learn new technology skills. Librarians' teaching style may also reflect the faculty member's course structure, and his or her assumptions about learning, such as whether working with other students on assignments is academically honest.

Hoadley and Pea write that "an effective learning community is a knowledge-building community of practice, one in which members of the community interact to collaboratively help other individuals and the group to increase their knowledge."[iv] Learning communities emphasize the notion that each member, including the faculty member, can learn from other members of the community. There is less emphasis on the teacher as sole expert than in traditionally taught courses. This distinctive assumption about the learning environment could provide the foundation for information literacy programs by developing mechanisms to give students more of a role in teaching, and not just learning, about information. Today's students work in groups both as a formal part of course assignments and informally, blending academic and social aspects of their lives. Giving students a more central role in the learning process related to information literacy might result in students becoming more invested in learning about information topics. For example, librarians could train one student or a small group of students in a course to be the information literacy experts for that course and those students would be available online to assist their classmates. If some formal class instruction were needed, the trained student(s) could conduct an overview in a computer lab and then provide time where the other students explore resources as they circulate to assist students who need help. A

librarian could be on hand physically or via chat to answer questions that were beyond the students' expertise.

In another model, learning communities could be supported throughout the semester via an online presence by a librarian in the environment of a course management system. The early concern that the Internet would isolate people and encourage individuals to spend many hours alone has not been supported by evidence. The authors of a Pew Internet & American Life survey in 2001 concluded that "the online world is a vibrant social universe where many Internet users enjoy serious and satisfying contact with online communities."[v] In courses that actively use a course management system such as Blackboard™ or WebCT™, or in distance education courses, librarians could establish a presence beyond posting and linking lists of library resources appropriate to course assignments. They could offer "office hours" at critical dates during the semester, write a blog that suggests resources or offers pointers on research, develop social bookmarking services, or participate in a class discussion board. These are all mechanisms that have the potential to foster the development of community among class members in the virtual environment.

Implications for Integrating Technology, Information Literacy, and Needs and Preferences of Net Gen Students

As libraries contemplate the direction of their information literacy programs, develop new services, and renovate or build new spaces, they can explore how the interplay of physical and virtual spaces, new technologies, content, and services, can be molded into an information environment that is responsive to the needs of Net Gen learners. Will libraries develop genuinely innovative programs that embrace new ways of making themselves a more integral part of the teaching and learning environment, or will they merely modernize traditional ways of serving their users?

Games

In higher education circles, when the topic of gaming comes up in discussions of learning with technology, it is sometimes dismissed quickly because of a misunderstanding of how the term "gaming" is generally being used in the educational context. Many adults immediately conjure up visions of violent games that promote anti-social behavior, and while such games are a large part of the entertainment market, there is a growing recognition that computer games designed for educational purposes have a potentially important role to play.

Students enjoy computer games for a variety of reasons, and many are congruent with the principles of deeper learning.[vi] For example, games are engaging; they draw students into a situation, such as a crisis in a simulation that may have connections to real world situations. Students gradually build skills during the playing of games, which is the type of contextual learning advocated by the National Academies in their report *How People Learn*.[vii] The students have to apply the skills they've learned in one context to a different context.

Today's students like active learning, and a problem-solving environment is ideal for them. They like progressing to higher levels of mastery and receiving rewards, even if the reward is some type of virtual icon. When games are played in a group, they also incorporate the benefits of collaborative learning. While not referring to games *per se*, Kuh and his colleagues wrote, "this pedagogical approach [active and collaborative learning] is positively and significantly related to all areas of student engagement and all measures of what students gain from their collegiate experience."[viii]

Others have more directly extolled the virtues of games in the context of learning. One author writes that good teachers "know how to engage and motivate students to pay attention, and to keep focused for long and productive periods on specific learning activities. In this regard, videogames are unparalleled. Providing intense multimodal experiences that blend near-photorealistic 3D graphics, animation, and sound effects, videogames are powerful problem solving and guided discovery tools."[ix] He writes further that while some educators question the value of games, they need to understand that the game interface is just the "motivational engine" that encourages students to delve deeply into the system, encouraging them to develop skills and knowledge.

Of the learning objects specifically designed to develop information literacy, "TILT," the game-show style online tutorial developed at University of Texas, Austin library <http://tilt.lib.utsystem.edu/> is the best known. This tool is designed to develop some basic information literacy skills while students step through a series of questions with visuals, such as spinning wheels, that are typically used on television game shows. The underlying concept of this game-like tutorial is to engage learners in a fun exercise while teaching some basic skills that are not particularly engaging alone. Other academic libraries have adapted and adopted the TILT game for their information literacy programs.

While TILT is designed for use by individuals, a new generation of information literacy games could be designed for group discovery and learning. Since many Net Gen students like working in groups and enjoy tangible (or virtual) rewards for their success in games, information literacy game developers could develop a mode where the game was played by small groups within a class or by different sections of large courses, where those with high scores would win some type of prize. The developers of an agricultural economics game used in 12th grade asked students to recommend improvements to the prototype, and the students suggested that the game be more of a competition. The developers revised the way they implement the game, holding a competition between school teams and providing prizes for those who achieve a high profit and achieve a high "good will" score.[x] Use of games in a group context can build community while enhancing information literacy skills. The element of competition itself can promote the team identification aspects of community.

Simulations

Another type of gaming activity is the use of computer simulations in education. This is the area where the most development and progress are occurring at the higher education level. Many of the simulations being developed for higher education emphasize teamwork as part of playing the game. Simulations are usually problem-solving activities, where students are presented with a situation related to the topic being studied and given some instructions on their task(s). As they progress through the simulation, they are given further instructions until they reach the end. Some simulations involve periodic group or class conversations to assess what has been learned up to that point before going on to next steps. Resources for games suited for the academic market are M.I.T. PDA Participatory Simulations Site <http://education.mit.edu/pda/index.htm> and the Woodrow Wilson Center for International Scholars' Serious Games Initiative <http://www.seriousgames.org/about.html>.

There are several ways that libraries could become more involved in the world of games and simulations. They could develop simulations that involve searching for information resources, accessing and evaluating them, and creating bibliographies. They could involve realistic environments of the library building and the library's interface to online resources. Development of simulations with sophisticated graphics requires a serious investment of resources and a high level of expertise. Today's college students expect rich and complex graphics, not amateur productions. While developing stand-alone simulations for an individual library does not seem to be a realistic option for most institutions, it would be possible for a consortium or other group of universities to pool resources and develop an information literacy simulation. Another possibility would be to engage partners to develop simulations for particular content subsets, for example a business resources information literacy simulation. The James Madison University Libraries, in partnership with their institution's Center for Instructional Technology and Center for Assessment and Research Studies, is reconfiguring its information literacy tutorial into a gaming format; the game will focus on health sciences.[xi]

Another promising avenue for libraries to become involved with simulations is for them to actively work with institutes, companies, and individuals who are developing simulations for particular content areas, such as engineering, business, environmental science, history, or literature. As part of the set of tools available for problem-solving in these virtual environments, a link to the library, a set of selected digital library resources, or a guide developed by librarians for the content area could be integrated into the simulation and thereby promote the use of quality information resources as part of the problem-solving process. For example, in a simulation where students have to determine the cause of an environmental contamination and recommend a course of action to ameliorate the situation, they could be guided to resources that had chemical information, public safety information, and other types of resources. A challenge in developing this kind of learning tool is creating the right kind of balance between close guidance—through presentation of pre-selected resources—and

scaffolding which encourages students to find information in a more open-ended search process.

Virtual worlds

A newer arena that libraries could use to become involved in gaming is the realm of virtual worlds. Unlike simulations, which generally follow a narrative and emphasize problem-solving with a clear beginning and end point, some virtual worlds are environments that focus on the establishment of sub-communities in which various events or communications takes place. An example of this type of virtual world is the very large-scale (often referred to as "massive") multi-user virtual world called "Second Life," <http://secondlife.com/> which was featured at a conference on gaming and education at the National Academies.[xii] One can join this virtual world free of charge although some advanced services involve payments. In this environment, individuals take on a virtual persona, called an avatar, and appear on the screen as that character. An individual's character can take various actions, including building virtual spaces that are virtual representations of the physical world. For example, members of "Second Life" have developed newspapers, memorials, fund raising events for survivors of natural disasters, virtual book signings, and a library. At present, this library serves as a venue in which members of "Second Life" can deposit their own writings. It is a collection of creative output, which is valuable but only one aspect of a library.

Academic librarians should create opportunities to create more robust libraries that offer services and interactions in virtual worlds. These environments appeal to Net Gen students because the worlds have rich visual content, they are active – characters do things, and they are social, involving virtual interaction that is sometimes blended with in-person contact. For example, some students take their laptops and get together in someone's dorm room to play in virtual worlds together, while they simultaneously interact with individuals who are not in their physical location. Students seem to thrive in these environments that blend individual and group activity, and in-person and virtual social interactions. Librarians would need to understand which virtual worlds their students tend to join and whether they would be suitable venues for library presence. Then, librarians would need to determine what types of services they could offer, how they would visually represent them, and how they would staff them. While this approach might not appeal to a wide range of academic libraries, those that serve a student population that tends to heavily populate virtual worlds may wish to explore this avenue for delivering services. This might be similar to the way the Internet Public Library www.ipl.org operates, but rather than setting things up so that users need to go to a separate location and actively seek out the library, it would be right there in an environment where they spend time. There is room for experimentation in the delivery of library services and information literacy education, and it would be of great value to the library community if even a small number of libraries experimented in the virtual world arena and reported their results.

Learning spaces
Technology also has implications for shaping libraries' physical environments. There are a number of ways that libraries can reconfigure space to promote a sense of campus community and to enhance the delivery of information literacy instruction. Many libraries are undergoing renovations and expansions to address the changes they need to make in their physical facilities as the result of developments in technology, e.g. pervasiveness use of the Internet and wireless communications, increased interest in active learning, and the blending of social communication and academic work in library facilities. Frequently, the changes to address these factors result in libraries planning information commons or learning commons for their facilities. These spaces include workstations with more extensive software than was typical in most reference rooms, staff that are trained to assist with both content and technology questions, and work areas configured for group use in addition to the traditional single person workstation furniture. New learning spaces can also foster a sense of community by displaying the work products of faculty, students, and staff, either through display of artifacts or virtual displays of digital productions.

Learning spaces for group use
Libraries are adapting to the norms of Net Gen learners, who have a propensity for working in groups. This group activity may combine actual academic work with intermittent socializing, both with friends who are present in the physical space and those that are accessible via instant messaging, cell phone, etc. Students often like to work in groups even if they are not all working on the same assignments, trading bits of information and enjoying companionship. Traditional libraries have emphasized quiet spaces for individual study, and most librarians and users agree that a proportion of library space needs to continue to serve that traditional function. However, libraries are adapting to the need for a portion of their space to be configured for group use.

A variety of configurations can address the needs of group work, and it is generally useful to have a number of options for group work in one facility. For example, some students like to gather on soft furniture like sofas and armchairs while discussing next steps to take on a group project. With wireless access, they can easily access course management systems, library resources, Internet resources, the faculty, and friends. A café in the library can serve the same purpose, while providing refreshment. Many libraries are dispensing with the "no food in the library rule" and establishing cafes in their buildings.

Many information commons include group study rooms, which often have a central work table, white boards, and various types of equipment such as a computer and projector. Other group rooms may be set up as practice presentation spaces, where students can practice presenting a talk at a podium and invite their friends to sit in the "audience" and critique their performance prior to their actual presentation in class. Other group spaces offer high-end multi-

media production equipment so that students can develop multi-media products for their course assignments or campus activities. Some group spaces may also be large tables or work spaces in an open area, if noise is not an issue and quiet spaces are available on other floors. Stanford Meyer Library offers an innovative collaborative service called TeamSpot in an open area of the library <http://academiccomputing.stanford.edu/teamspot/>. Students connect their laptops in a collaborative space and are able to each make modifications on a large screen shared display. The facility was specifically designed to support group, problem-solving work. All of these types of learning spaces encourage students to interact in the context of their academic work and as a byproduct promote a sense of community and belonging.

Learning spaces for information literacy instruction
Information commons or other areas of the library frequently incorporate some classroom space for information literacy sessions or other types of classes. In designing or renovating these classrooms, flexibility is key as technologies and preferred teaching methods are in flux. Tables and chairs with wheels are readily available in the market, and provide maximum flexibility. Classrooms with movable tables can be quickly changed from lecture format, all facing forward, to group work style, with chairs on all sides. Classrooms with white boards on at least three walls can be rearranged without regard to which orientation is the true front of the room. With flexible spaces, librarians may be encouraged to incorporate large segments of group work, in which students actively learn as they pursue information for their course-related assignments during information literacy sessions.

Learning spaces for multi-media production
Some libraries incorporate multi-media production units into their facilities, and they may operate like a separate entity within the library or they may be integrated into some services, such as information literacy programs. Multi-media production offers new opportunities for librarians and other information professionals to teach students about a wide range of topics, including searching for existing information as background for projects, finding images, sound files, and moving images to incorporate into projects, working with multi-media software, and developing projects that are academic in quality and not just entertaining. Many students produce multi-media productions as course projects, either because they are specifically required by the faculty or, more commonly, because they choose to express themselves in this medium. Working with students in this arena provides particularly good opportunities for librarians to educate students about intellectual property issues, in the context of students as users of information produced by others, and as creators of products that will be used by others. If multi-media production units are administratively outside the library, librarians should seek opportunities to collaborate with the individuals who provide workshops or other instruction in this area, offering to add their skills and knowledge to sessions with students and/or faculty.

Spaces for learning communities

While most information commons are planned with the overall needs of the campus community in mind, one university planned such a facility with a component that specifically addresses the needs of the institution's learning communities program. At the University of Kansas, a group was charged with developing a plan for a collaborative learning environment (physical space) that would also improve information and technology services. Included in the planning group were representatives from the campus's freshman learning communities initiative since the learning community groups had difficulties "finding a place to gather where they could study, discuss ideas related to their particular theme, work on assignments together, or interact with faculty outside the classroom."[xiii]   Parts of the facility were designed to provide the needed community spaces. This information commons space was developed in a former computer lab and not in the main library. In a related outcome, the committee found that while the freshman program of collaborative communities existed, few faculty teaching only upper level courses were familiar with the goals and principles of collaborative learning, and they instituted some faculty workshops to develop a greater awareness and adoption of the learning communities principles among faculty.

Taking steps

Overall, addressing information literacy needs today requires some fundamental re-thinking about the librarians' and library's role in learning. Learning communities focus on every participant's capabilities to be both teacher and learner. This requires some reorientation in the pervasive model of information literacy, where the librarian is the clear "faculty expert" to a new model where the librarian learns about information seeking and production from students as well as contributing knowledge to the class. Making a commitment to change requires resources, particularly staff time. One suggestion for beginning the change process is to have each librarian involved in information literacy instruction develop a relationship with one course in which the librarian's goal is to become a member of that learning community for a semester. Ideally, the course chosen would have a faculty member who incorporates active and collaborative learning styles into the class, gives assignments that require outside information resources, and is open to partnership with a librarian.

Libraries could assign an individual or small group to begin to study and participate in games and virtual worlds in order to understand what might work for their campus community and how the games and virtual worlds might be used to incorporate information literacy components. Ideally, the individual would consult with or work with students, or if a small group is assigned the work, it should include some students.

Libraries that are early in the planning process for renovations of facilities, and therefore have years before the facility is ready, or those that have no funds for

renovation, can begin to plan incremental changes that could have an important impact. Rearranging existing furniture to provide designated space for group work, installing cafes, or buying some inexpensive comfortable furniture in an area with wireless access, can help the library contribute to developing a sense of community within the institution.

<u>Conclusion</u>
Libraries can use technology, in development of services, information literacy programs, and facilities to foster learning communities. New opportunities exist to enhance the library's participation in campus learning communities through the use of gaming in the curriculum and the provision of newly configured social spaces. Librarians can seek opportunities to become involved in existing campus learning communities, and use them as venues to incorporate information literacy instruction, while learning from students themselves about their use of technologies and information. With new configurations, librarians can provide learning spaces that encourage active, collaborative learning and give students access to the wide range of technologies they need to work in today's learning environments. Libraries and librarians can continue to play a vital role in students' learning if they evolve their services and facilities to incorporate features that engage twenty-first century learners.

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