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## **Participatory Co-Design: A Relationship Building Approach for Co-Creating Libraries of the Future**

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The first years of the new millennium have seen dramatic changes in how information is produced, as well as how it is organized and accessed. Within the increasingly digital environment, technology continues to transform how we encounter and experience information. For example, individuals can now produce and share their own information, rather than waiting for book or journal publishers to create and deliver the material – a concept known as peer production. Internet-based social networking sites offer yet another popular way to create and exchange unmediated information. Because these new technology tools enable easy information production and consumption, individuals increasingly circumvent what has traditionally been the role of libraries – organizing, managing, and enabling access. These circumstances challenge libraries' traditional role as repositories of human culture, forcing libraries to evolve.

The dynamically changing information landscape prompted faculty researchers from four institutions on three continents to develop a collaborative approach for co-designing libraries of the future. The methodology evolved out of projects involving students in working alongside academic librarians and other campus stakeholders to co-create digital learning objects and digital learning environments. Highly participatory in nature, the design processes benefited from the knowledge of students raised in the United States, Sweden, and Australia, who have grown up with the digital technologies developed in the last decades of the 20<sup>th</sup> century and now widely available in the new millennium. These students have spent their entire lives using computers, video games, digital music players, video cameras, mobile phones, email, instant messaging, and other technology tools and toys. As a result, these 'digital natives' think and act differently than the people for whom today's libraries were designed.

Participatory co-design also reflects the fundamental shift in higher education from an emphasis on teaching to a focus on learning. The new emphasis on student-centered learning outcomes requires changes in the traditional non-consultative approach to educational design and delivery, including reconsideration of current strategies for cultivating information literacy and encouraging resource usage. These converging factors prompted researchers to explore how organizations might move from 'library-centric' to 'user-centered' decision making processes.

### Co-Design Fundamentals

Within the context of fundamental changes in higher education across the globe, university researchers from Europe, Australia, and the United States have worked since 2003 on identifying replicable approaches to better align library performance outcomes and organizational priorities with changing knowledge creation practices and resultant consumer/producer expectations. Throughout, researchers sought to stimulate co-design collaborations that initiated relationships and enabled learning.

Various interactive, user-centered design (UCD) methodologies were employed, according to specific projects' needs. While quantitative research methods were sometimes used, research methodologies typically emphasized:

- Qualitative data collection and analysis methodologies such as open ended interviews, focus groups, ethnographic studies, and participant observation and
- Interactive design processes which led to rapid prototyping of solutions that were, in turn, evaluated, modified, and implemented – by incorporating user feedback - in a relatively short time frame.

Informed and fortified by dialogue between librarians and users, co-design activities were characterized by:

- A process: user-centric, interdisciplinary, iterative investigations and
- An outcome: usable products, applications, environments.

The examples which follow illustrate some of the collaborative learning relationships which librarians developed with users. These experiences changed how participating librarians thought and what they thought about as they sought to enhance value for users and overcome barriers to access. Developed and tested in two institutions (Luleå University of Technology (Ltu), Sweden and California Polytechnic State University (Cal Poly), USA), the co-design approach is now being implemented at the Dr. Martin Luther King, Jr. Library – an award winning joint university-public library in California's Silicon Valley.

### Participatory Process Outcomes

For four years, faculty researchers at Luleå University of Technology (Sweden), Queensland University of Technology (Australia), California Polytechnic State University (USA), and San José State University (USA) have investigated means for co-creating libraries of the future for and with present and potential user communities. With deep roots in Scandinavian participatory design philosophy and practice, this 'research-in-practice' approach applies student insights to identify new Digital Age opportunities for libraries.

As the following project outcomes illustrate, student framed, student conducted, and student interpreted research findings informed libraries' digital research and development (R&D) efforts. Employing a range of methodologies – e.g., focus groups, usability studies, rapid prototyping, and survey instruments – student generated research data produced real world benefits. At the same time, these inclusive R&D processes built the sustainable relationships necessary for library staff to understand user expectations and preferences now and in the future.

The undergraduate students first involved in the librarians' co-design discovery process were third year computer science students at California Polytechnic State University (Cal Poly) in San Luis Obispo. The campus is one of twenty-three institutions in the California State University (CSU) system. With over 300,000 students, it is the largest publicly funded higher education system in the world. Cal Poly is one of the larger campuses, with 18,000 students – including nearly 10,000 undergraduate students enrolled in the basic and applied sciences and engineering. The university's distinctive 'learn by doing' educational philosophy guided the co-design project – i.e., both librarians and students felt comfortable learning by doing.

In 2004, human-computer interaction (HCI) students were invited to evaluate an 'out of the box' federated search engine (ExLibris MetaLib) for searching multiple databases and accessing full text documents. They selected a variety of user-centered design approaches to seek input from their peers. For instance, they developed, tested, and implemented a questionnaire that focused on student research habits, student research skills, and student learning styles. In addition, they collected evidence from usability studies of the current interface supplemented by undergraduate students' focus group transcripts. Student research subjects were – throughout - intentionally diverse, so as to reflect perspectives representative of the entire university student population.

At the conclusion of their research, students produced a report for librarians' consideration. Student researchers unanimously recommended that:

- The 'meta' search engine should mirror the 'look and feel' of Google's search functionalities,
- A 'my e-shelf' should permit citations to be organized by course and indicate availability, including full-text status,
- A 'my databases' should permit saving lists by course and allow federated database metasearching, and
- A 'my e-journal' list should capture search history, provide an alert profile, and allow direct linkage to the 'my PolyCAT' (university online catalog) customizable information organization space.

Comparison of student recommendations and the vendor's interface revealed a serious 'gap.' In response, Cal Poly librarians worked with library programmers to integrate students' suggestions into a customized interface for Cal Poly information seekers. Students' findings were also sent to the vendor's R&D team, who chose to integrate many of the students' recommendations into the next release of the commercial product.

Out of this initial co-design experience, librarians learned to examine the underlying assumptions and beliefs that traditionally guided their library interface design decisions. They recognized that achievement of 'user centeredness' requires rethinking traditional assumptions about what to study, as well as how – and with whom - to conduct research.

### User-Created Enhancements

As the preceding discussion illustrates, a user-centric approach to co-creating effective user interfaces - the means by which end users communicate with technology - requires careful consideration of the context for usage. For example, interaction designers must consider:

- How do people work?
- How do people solve problems?
- How will technology enabled 'solutions' be incorporated into work practices?
- How do people interpret the technology enabled systems' output?
- What are user communities' information and technology usage strengths and weaknesses?

Recognition of the importance of these considerations informed librarians' desire to deepen their investigatory relationships with students. Subsequent research projects, therefore, posed more ambitious questions. For instance, students explored how their peers interact with and relate to information. This expanded research focus produced user generated, technology-enabled knowledge production and social exchange projects within a "zone of innovation" in the Cal Poly learning commons (<http://learningcommons.lib.calpoly.edu/>). The purpose of the commons is to:

- Provide technological infrastructure, pedagogy and technology expertise, and information resources and consultation to enable faculty innovation and curriculum revitalization.
- Encourage application of constructivist principles to advance students' information, communication, and technology proficiencies for life long learning.

The initiative originated within the Offices of the President and the Provost. Funding required that the faculty professional development center (CTL), the university library (LIB), and the campus information technology services (ITS) create integrated services and systems to support faculty teaching – and student learning - innovations. The student-centered campus culture quite naturally involved many undergraduate students - and interested teaching faculty - in design activities. For instance, students on the campus computing committee advised the learning commons partners (CTL-ITS-LIB) on the evolving commons concept throughout the planning year. Concurrently, the emerging concept was approved by senior academic administrators, the academic senate technology committee, the council of deans, and other campus governance and advisory bodies. Throughout, rich campus wide input informed the design concept.

After the learning commons opened, students were invited to conduct project-based investigations to further 'next phase' developments. Supervised by campus faculty, students generated research questions, selected research methodologies, and interpreted research data. Results revealed students' recommendations for extending the purpose of the commons to:

- Promote cross-disciplinary inquiry and discourse and
- Create an inclusive, interactive learning community.

In presenting their ideas to learning commons planners, students emphasized that peer production practices for inclusive social information exchange and knowledge creation required that learning commons service providers should also include writing center experts, study skills specialists, and software training consultants. This advice served to enlarge the 'service circle' originally envisioned by the CTL-ITS-LIB planners.

Students also recommended a virtual as well as a physical commons. For example, students in software engineering and artificial intelligence courses used 3D-modeling techniques to design learning spaces and learning tools for the Cal Poly learning commons. Then they conducted usability evaluations – employing focus groups, online surveys, and usability experiments. Their projects explored many student-centered enhancements. They were especially interested in the learning potential of virtual collaboration rooms, a senior project marketplace, a multimedia café, and a campus knowledge repository. These new student generated ideas stimulated planners' interest in continuing co-design activities, as they reconsidered their original design assumptions.

Another significant difference in planner perspectives and student viewpoints involved the matter of formal and informal learning spaces. While the CTL-LIB-ITS planners had focused primarily on advancing students' formal learning activities, students recommended blending formal and informal learning experiences. Their multimedia café proposal, for instance, included ready access to food and drink as well as relaxing/leisure opportunities. Students' 'best practices' recommendations were derived from industry standards set by Starbucks coffee houses and Borders/Barnes and Noble bookstores – further challenging planners' traditional assumptions.

In the Cal Poly co-design projects, students worked in teams. Learning advanced by addressing real world problems (and opportunities). A variety of user-centric human-computer interaction (HCI) and human-information interaction (HII) research methodologies were employed. This offered a number of important benefits. First, data collection and interpretation required considerable face-to-face communication between librarians and students. These clarifying dialogues offered librarians valuable insights into user perspectives. In addition, librarians' relationships with the students oftentimes continued beyond the quarter, fostering ongoing communication which informed librarians' understanding of users' perspectives on a wide range of library issues. This collaborative approach naturally encouraged continuous library organization improvement, even as it fostered sustainable relationships with members of diverse campus communities. Ongoing conversations will continue library wide rethinking and re-orientation.

## Library Organization 2.0

Participatory co-design inherently recognizes that changing circumstances require redefinition of academic and public libraries' roles, goals, and methods. Co-design results-to-date suggest that user generated research questions produce investigations of relevance to present and potential users. When decision makers attend to these recommendations, library staff experience organizational re-

orientation. Co-design, therefore, serves an important role in establishing a culture of transformative, dialogue-based collaborative design and development.

In such a workplace environment, librarians converse with users in the spirit of appreciative inquiry. Conversations promote appreciation for diverse perspectives and contexts. These relationship building processes produce two-way empathy and insight. At the same time, this approach places users' learning at the center, aiding discovery of their own methods for acquiring, interpreting, and applying knowledge. In addition, growing familiarity with digital age technology tools and toys promises to help librarians remain current and relevant in a rapidly changing information and communication technology environment.

With the shared aim of using co-design philosophy to develop sustainable relationships and deepen conversations between builders and beneficiaries, academic and public librarians now prepare to assume exciting new roles as architects of digital information management and knowledge creation tools at the Dr. Martin Luther King, Jr. Library in San José, California, USA (<http://www.sjlibrary.org/>). The San José State University (SJSU) Library and the San José Public Library (SJPL) participate in a unique collaboration to create a lifelong learning center for the extended San José community. As the nation's first and largest co-managed academic and public library, King Library's resources are not only available to the university's students and faculty, but also to every member of the Silicon Valley community. The modern, state-of-the-art facility, enriched by abundant physical and virtual information resources, invites people from diverse backgrounds to come together to explore issues, share ideas, and expand knowledge, supported by high quality programs and services for both campus and community audiences.

With the goal of readying library staff to evolve a culturally appropriate participatory co-design model, ninety-nine employees at King Library completed a fifteen-week online discovery learning initiative between January and April 2007. Developed by Helene Blowers, Public Services Technology Director at the Public Library of Charlotte and Mecklenburg County (PLCMC), Learning 2.0 prepares staff to explore new technologies (<http://plcmcl2-about.blogspot.com/2006/08/about-learning-20-project.html#contact>). Participants in the San José King Library initiative (<http://sjlibrary23.blogspot.com/>) included librarians, as well as paraprofessionals and administrators in the joint city-university organization. Completion of the "23 things" in the online program enabled participants to learn more about the tools and technologies that are changing the way people, libraries, and society access information and communicate with each other. Toward that end, participants gained practical experience with popular Web 2.0 information creation and exchange tools found freely available on the Internet, such as:

- **Blogs** – an easy-to-use web site, where users can quickly post thoughts and interact with people – similar to a log, journal, or online diary
- **Wikis** – a collaborative website creation and authoring tool that allows users to easily add, remove and edit website content
- **Tagging** – an open and informal method of categorizing that allows users to associate keywords or "tags" with online content. (Unlike traditional library subject cataloging, that follows a strict set of guidelines for categorization, tagging is completely unstructured and freeform, allowing users to create personally meaningful connections between data.)
- **Flickr** – an online photo sharing community that uses "tags" or keywords to help identify and search for photos

- **RSS feeds** – “Really Simple Syndication” simplifies the way news, media, and content creators share information and, in turn, permits everyday users to customize the ways they consume information over the web

To further explore how they might apply Learning 2.0 capabilities to co-create robust physical and virtual ‘knowledge making’ places and spaces for and with users, university librarians have also completed – though not yet analyzed - three research projects involving San José State University (SJSU) students and faculty. These studies reflect that, while this merged city-university library is united by a common mission to serve the lifelong learning needs of campus and community users, the San José State University library ‘side of the house’ also has a responsibility to advance the campus teaching, learning, and research mission. These SJSU studies illustrate how local circumstances produce different organizational co-design strategies.

In April 2007, to gain further insight into student perspectives, university librarians implemented an EDUCAUSE Learning Initiative (ELI) Student Input on Learning Spaces Tool. EDUCAUSE ([www.educause.edu](http://www.educause.edu)) is a US-based nonprofit association with a mission to advance higher education by promoting the intelligent use of information technology. Based on a protocol developed by Dr. Andrew Milne, CEO of Tidebreak Inc. ([www.tidebreak.com](http://www.tidebreak.com)), and patterned on need-finding techniques practiced at Stanford University’s Institute of Design, the ELI instrument offers a way to obtain creative user input when planning and designing learning spaces.

The research project involved students representing different ages, class standing, gender, and majors, as well as those who live on- and off-campus. They completed the learning spaces survey and, as well - using a 24-exposure disposable camera - took photographs of the locations described in the learning space survey – e.g., favorite place for group work. In organizing the data for analysis, academic librarians, campus technologists, and instructional designers used Flickr visual tagging software, one of the ‘23 things’ in Learning 2.0. Using the tags for sorting then permits identification of the least favorite space on campus for freshmen. The same process can be used to make comparisons - e.g., comparing least favorite places for freshmen and seniors. As the data interpretation continues, students who completed the learning spaces instrument will offer their interpretations of text and image data. The resulting dialogue will both advance participant co-learning and ensure user-centered conclusions.

In a second study conducted in May 2007, librarians collaborated with library board members to conduct a phenomenographic investigation of faculty members’ ideas. This qualitative approach studies differing ways in which people experience, perceive, apprehend, understand, and conceptualize various phenomena in and aspects of the world. It has been used successfully in other educational research – i.e., in 1997 in Australia, Christine Bruce studied university staff’s conceptions of information literacy; in 2004 in Australia, Mandy Lupton studied students’ conceptions of information literacy; in 2005 in California, Clarence Maybee and Mary M. Somerville also studied undergraduate students’ conceptions of information literacy (at Cal Poly in San Luis Obispo); and in 2005 in the United Kingdom, Sheila Webber and Bill Johnston studied academics’ conceptions of information literacy.

The San José study modified Johnston and Webber’s research questions to explore the differing ways that professors experience, perceive, apprehend, understand, and conceptualize information literacy. Open ended questions presented to SJSU faculty participants included:

- Describe an information literate student.
- How do you engage your students in information literacy?
- What are some of the challenges of teaching information literacy?

The first two questions intended to elicit reflections and descriptions. The third question encouraged interviewees to think about both day-to-day constraints and also aspirations and hopes.

The recorded data is currently being transcribed, in preparation for analysis. When interpreting the data, attention will not focus on the individual, but rather the aggregated data. Transcripts of individual interviews will be analyzed as a whole. Categories will be assigned to describe faculty members' different ways of experiencing the phenomenon of teaching information literacy, seeking in particular the elements that are in "focal awareness" (i.e., centrally important) for each category. Through inductive analysis, "categories of description" will emerge which describe each qualitatively different conception of what is most central. These insights will be shared with campus learning partners through inclusive campus conversations about information literacy and its teaching.

Librarians will also use a third data source to inform their reflections on the best uses for their Learning 2.0 competencies – the Educational Testing Service's standardized "digital literacy" assessment instrument. Since 2001, test developers, cognitive scientists, and research statisticians have collaborated with US-based Educational Testing Service ([www.ets.org](http://www.ets.org)) assessment directors, university administrators, faculty members, academic librarians, and workforce specialists on the design and testing of questions for this large-scale, web-based assessment tool. The instrument crosses disciplines and class levels to assess cognitive abilities and technical skills along with the ethical and legal use of information necessary for information literacy and technology fluency in the digital age. The information and communication technology (ICT) literacy assessment measures students' proficiencies in seven skill areas: define, access, evaluate, manage, integrate, create, and communicate. San José State University students participated in the national beta test in 2005. These results informed a commercial version of the assessment which, in 2006, began to report both individual and group scores. While the data has been collected, it has yet to be analyzed. Nor have the educational implications for findings been considered.

Campus conversations about faculty information literacy conceptions and classroom pedagogy practices, enriched by discussion about student ICT literacy proficiencies and learning spaces likes and dislikes, now predict synergistic co-design conversations throughout the planning process for a physical and virtual learning commons in the Dr. Martin Luther King, Jr. Library.

#### Joint Library Digital Futures

Details for extending this Silicon Valley co-design approach - in terms appropriate to the merged library culture and context - will result from the King Library's strategic planning process set to begin in June 2007. The planning process will involve large numbers of staff members from both the university library and the public library. Outcomes will inform the involvement of public library users in 'next step' investigation of joint library enhancements for this metropolitan library. In so doing, librarians are mindful of the difficulties in balancing the traditional library role as a repository of human culture and the potential library role as a facilitator of human culture.



By way of suggesting the complex context for library decision makers are these facts. San José is the location of the worldwide headquarters for Adobe Systems, eBay, and Cisco Systems. The worldwide headquarters for Apple Computers, Yahoo, and Google are located within ten miles of San José's city boundaries. Amidst this high tech environment, over 400,000 people have insufficient income to meet the basics of life. 'A world apart,' they lack affordable housing, health care, and educational attainment (<http://www.uwsv.org/index.php?id=35&sub=2>). Many do not possess basic literacy skills nor enough reliable food sources. This situation – which some have characterized as the 'digital divide' – possesses immense issues for a joint library committed to advancing the lifelong learning of its highly diverse citizenry.

In anticipation of upcoming planning conversations – and in the spirit of relationship building through co-design activities with campus and city community members, public and university library employees acknowledge that their workplace will increasingly depend on user-produced evidence to guide the identification and evaluation of digital library initiatives. They recognize that the challenges of anticipating needs and preferences of culturally, linguistically, and ethnically diverse populations require heightened capabilities to consultatively reconcile divergent interpretations in a continuous organizational learning process. And, finally, they anticipate that a strengthened user-centric approach will transform the workplace as public and university library staff members - together with the communities they serve – co-create the library's new roles, responsibilities, and relationships.

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