

## A Heuristic Approach to Student Learning: A Hong Kong Perspective

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*Abstract: Students today are challenged to acquire knowledge and skills to think critically, contextually, and to transfer knowledge to exceed expectations. The learning process often requires heuristic inquiry that utilizes access to all types of information resources. This presents opportunities and challenges for information service support to integrate resources into the curriculum to enable the students to carry on learning beyond the classroom. In response to the changing academic landscape at the University of Hong Kong, it is necessary to align the information service role of the library with the mission of the University to assume an active and relevant partnering role. One of the major challenges is to better understand how to reach the students to enable learning and discovery within their curricula, to enrich their inquiring mind through engaged use of information which is increasingly interdisciplinary, distributed in digital and media. In Hong Kong where local secondary education is more exam based and students concentrate on tackling model questions and answers for exams but are not used to research for scholarly information, librarians have a role in helping students make the transition to face the different study approach at university. How can librarians assist students to develop better in their studies to enrich their learning experience? The study presented in this paper uses a student learning activity to investigate the students' research habits and the impact of information research assistance on their research skills and assessment result. Research findings generally suggest that there is some correlation between the increased quality of student research as exhibited in the student's grade on the assignment when students are exposed to research assistance. The findings of the study will be used to guide the development of an appropriate strategy in information instruction support to enrich the learning process.*

Keywords: Student Learning, Learning Commons, 21st Century Learning, Faculty-Librarian Collaboration, Undergraduate Curriculum Reform, The University of Hong Kong

### Introduction

**S**TUDENTS TODAY ARE challenged to acquire knowledge and skills to think critically, contextually, and to transfer knowledge to exceed expectations. The Net Generation learners like to take control of their own learning and favor personal style of expressions. Focused on rapid knowledge acquisition, Net Gen students want the right content and the right tool “just in time” to engage in deeper learning and research beyond the classroom. Learning is about enabling connection, for example studying history to connect with current politics in society. The digital divide is no longer about getting access to technology and information resources but to acquire the fluency which enables learners to be active participants and contributors. The learning process often requires heuristic inquiry that utilizes access to all types of information resources and technology. This presents opportunities and challenges for information service providers in the design of new tools and services to aid discovery and accelerate learning. This paper will examine institutional curriculum

reform challenges and 21<sup>st</sup> century learning aims and expectations to better understand the behavior of learners and their information and technology needs.

This study is prompted by the move towards the four-year undergraduate curriculum to be implemented in the year 2012 from the present three-year system at the University of Hong Kong (HKU).<sup>1</sup> In response to the changing academic landscape, it is necessary to align the information service role of the library with the mission of the University to assume a relevant and active partnering role. One of the major challenges is to better understand how to reach the students to enable learning and discovery within their curricula, to enrich their inquiring mind through engaged use of information which is increasingly interdisciplinary, distributed in digital and media. In Hong Kong where local secondary education is more exam based and students concentrate on tackling model questions and answers for exams but are less accustomed to researching scholarly information, librarians have a role in helping students make the transition to face the different study approach at university.

The purpose of this paper is to explore the emerging opportunities for the libraries to develop new information support roles to enrich students' learning experience within a learning commons environment. The broad strategies to assist students, especially freshmen, to succeed in facing the challenges of the new four year university curriculum will be discussed. In view of the institutional challenges arising from the move toward the four-year undergraduate curriculum, information professionals need to better understand students' information research behavior in the local context as well as 21<sup>st</sup> century learning expectations in order to develop new service strategies. The study presented in this paper uses a student learning activity to investigate students' research behavior and the impact on their assessment results when information research assistance is provided to guide the process of inquiry. The findings of the study will guide the development of appropriate strategies in the design of information technology support to enrich the learning process.

## The University Environment

The University of Hong Kong (HKU) was established in 1911, and has grown not only in size but has reached a very high international standing, being ranked 24<sup>th</sup> in the World University Ranking (THE, 2009).<sup>2</sup> It has a student population of 21,652, about 40% of which is postgraduates and a faculty of about 2,800.<sup>3</sup>

HKU will approach its centenary in 2011, and is in the process of implementing plans for its new Centennial Campus, which will expand the size of its existing main campus by one-third and be equipped with leading edge teaching and research facilities. A central learning commons will be at the heart of the new Centennial Campus.<sup>4</sup> The Learning Commons will accommodate an extra cohort student enrollment when HKU changes to the new four-year curriculum in 2012.

<sup>1</sup> The University of Hong Kong Teaching & Learning. (n.d.). Undergraduate curriculum reform. Retrieved March 23, 2010, from <http://tl.hku.hk/undergraduate-curriculum-reform>

<sup>2</sup> Times Higher Education-QS World University Rankings 2009. (2009). Retrieved 23 March, 2010, from <http://www.timeshighereducation.co.uk/Rankings2009-Top200.html>

<sup>3</sup> The University of Hong Kong. (2009). QuickStats 2007-2008. Retrieved March 23, 2010, from <http://www.hku.hk/cpaosite/html/pub/quicks/2009.pdf>

<sup>4</sup> The University of Hong Kong. (2008, April). Learning Commons: Innovative spaces for student-centred learning. *HKU Centennial Campus e-newsletter*, 3. Retrieved March 23, 2010, from HKU Centennial Campus web site: <http://www3.hku.hk/cecampus/eng/enews/article.php?id=15>

The four year curriculum restructure aims to offer students an enriched learning experience through the development of a Common Core program designed to enable core generic competencies in different areas of inquiry and disciplines. The overarching goals are to enable students to develop a broader perspective and critical understanding of the complexities and interrelatedness of current issues, to cultivate global and cross-cultural awareness, and to strengthen the potential of students to give back to society as they graduate.<sup>5</sup> The curriculum reform aims to develop the following generic competencies or capabilities as the targeted learning results:

- *Critical intellectual inquiry in the disciplines, extending to life-long learning*
- *Tackling novel situations and critical thinking*
- *Critical self-reflection and understanding of others*
- *Intercultural communication, multicultural understanding and global citizenship*
- *Communication and collaboration*
- *Leadership and advocacy for the improvement of human condition.*<sup>6</sup>

The curriculum reform is coupled with a need to re-conceptualize learning space into a dynamic and interactive e-learning environment with a wide range of integrated web-based system of learning resources, services and underlying technology which facilitates discovery, sharing, exchange, transfer and creation of knowledge. The Libraries addresses the increasing demand for electronic services by creating an infrastructure that delivers access to its full range of latest information and communication technologies and digital collections. The major challenge for the Libraries to contribute as a partner is to integrate knowledge services which support foundation learning for undergraduates within the learning commons.

To preparing for the real world beyond the classroom and to thrive in today's global and knowledge economy driven by technology, students need to acquire more than the basic reading, writing and calculating skills to be considered literate, but also a set of generic skills, commonly referred as "21<sup>st</sup> century skills" to attain an expected level of digital literacies, cultural and global awareness, as well as social and transfer skills. The Framework for 21<sup>st</sup> Century Learning or P21 Framework describes the set of skills as the "knowledge, literacies and expertise students must be mastered to succeed in work and life; it is a blend of content knowledge, specific skills, expertise and literacy."<sup>7</sup> The framework developed by The Partnership for 21<sup>st</sup> Century Skills as a vision for student success in the new global economy encompasses three key components: learning and innovation skills, life and career skills, and information, media and technology skills. These three components are prescribed to build upon a base of core academic subject knowledge and 21<sup>st</sup> century interdisciplinary themes covering global awareness, financial/economic business and entrepreneurial literacy, civic literacy, health literacy, and environmental literacy. The 21<sup>st</sup> Century Workforce Commission of the National Alliance of Business prescribes skills encompassing four areas: digital age literacy or proficiencies, inventive thinking, effective communication and high

<sup>5</sup> The University of Hong Kong Teaching & Learning. (n.d.). *HKU Common Core Curriculum*. Retrieved 23 March, 2010, from <http://tl.caut.hku.hk/node/12>

<sup>6</sup> The University of Hong Kong Teaching & Learning. (n.d.). *HKU Educational Aims*. Retrieved 23 March, 2010, from <http://tl.caut.hku.hk/hku-educational-aims>

<sup>7</sup> Partnership for 21<sup>st</sup> Century Skills. (n.d.). *Framework for 21<sup>st</sup> Century Learning*. Retrieved 23 March, 2010, from [http://www.p21.org/index.php?option=com\\_content&task=view&id=254&Itemid=120](http://www.p21.org/index.php?option=com_content&task=view&id=254&Itemid=120)

productivity.<sup>8</sup> The fourth component “high productivity” is related to quality results in application or transfer of knowledge to real-world situations. Similar to the targeted core competencies of the curriculum reform, these 21<sup>st</sup> century skills components are the key attributes to successful student learning.

The educational process of heuristic inquiry presents many opportunities for information professionals to perform their valued role to navigate through complex information systems in search of the most relevant contents to support learning. The study presented in this paper uses a student learning activity (an essay assignment) as a model to investigate the process of inquiry and the needs and benefits of the collaboration between the professor and librarian to enrich the students’ broadening experience.

### **Study on HKU Students’ Perspectives of their Learning Experience**

The students’ perception of their research experience and perceived needs in information research assistance are identified through a survey intended for future course enhancement given to the student at the end of a broadening course. The course, *Scientific Perspectives: Obesity and Anorexia*, is offered to non-science majors in their first or second year and assessed on a continuous basis. First year students constitute 77% of the class with the majority from the Social Sciences including Law, Education, Business and Economics and the rest from the Arts. There is no formal examination for this course, but one of the assessment components is an essay assignment on a science topic. The assignment is to be tackled by the students themselves without reference to contents covered in the lectures. A heuristic or open approach is generally preferred to give students the opportunity to explore and discover on their own to broaden their science perspectives without restrictions. In the lead up to the four-year curriculum change, such broadening courses will be offered as the common core curriculum to broaden students’ perspectives to enrich learning in disciplines other than their major field of studies. Faculties associated with the development of the broadening courses perceive an absolute need to equip students with some advance subject knowledge of information resources to help them gain better perspective of the subject beyond the classroom.

The survey findings indicate that the majority or 73% of students surveyed deem themselves as trained or conversant in searching skills, in contrast to 47% of the students who respond in the written comments that they have difficulties in performing a focused search that yield relevant and quality results. Students express the need for guidance in deciphering the relevancy, quality and quantity of search results, particularly in defining technical or scientific terms encountered. Unsuccessful attempt in searching for appropriate resources is perceivable for this class of non-science students tackling a subject from a science perspective without adequate background and solid guiding questions or search terms. When asked to list in order of priority the top three sources of information which most frequently satisfy their information needs, HKU library resources only rank third after Google and Wikipedia. The most preferred choice for searching information for this class of students is the web search engine (78%), followed by the digital library collection (58%) and the physical collection (5%) being the least preferred.

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<sup>8</sup> NCREL / Metiri Group. (n.d.). *enGauge 21st Century Skills*. Retrieved March 23, 2010, from <http://www.metiri.com/features.html>

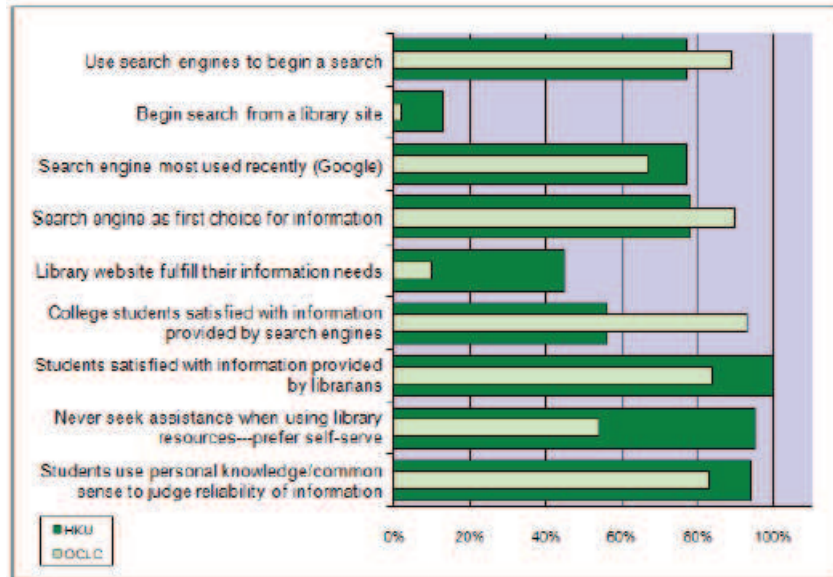


Figure 1: HKU Study vs. OCLC Study on Students' Perceptions of Information Searching, *Source: Perceptions of Libraries and Information Resources, OCLC, 2006*

It is no surprise that the web search engine is the Net Gen learners' preference for information discovery. Research shows that as little as 2 percent of US college students begin search from a library web site and their satisfaction with library website in fulfilling their research needs is as low as 10% and 45% for US and HKU students respectively (Figure 1). Whereas 93% of US college students are satisfied with information provided by search engines, HKU students are generally less satisfied (56%) with sources from search engines. Students rely on their knowledge and common sense to judge the reliability of information by consulting a range of websites and their teachers to validate information, and do not differentiate between library subscribed resources and information retrieved using search engines as long as they are relevant. A high percent (95%) of students surveyed prefer self-serve and claim they never seek librarian assistance, although it is still encouraging to note the few percent of students who has consulted a librarian for assistance are satisfied and agree that librarians add value to the search process. When asked whether it would be helpful if the teacher in collaboration with the subject librarian provide guidance on how to make successful searches for an assigned essay topic, 80% of the respondents gave a positive reply.

The survey also asks students to comment on the difficulties in searching relevant information. The students have identified the following challenges in tackling the essay assignment (*Mother's milk is best – the science behind it*) and have provided the following suggestions (in free form comments) explicitly for the professor to help students produce a better essay:

- *the topic poses challenge for the non-science students: the requirement and expectation for a scientific research paper versus a paper in the social sciences discipline should be explained at the outset*

- *need help to refine the topic, which is too broad to focus-e.g. biological or chemical aspect, the “open approach” left too much doubt in some students’ mind*
- *need guidance, not so much how to seek for information, but actually recommended sources which are relevant to the assignment*
- *want sample of a science essay to clarify the expectation and how to achieve good grade*
- *appreciate the freedom to search and think the approach was good; some students would prefer this way*
- *lesson/tutorial, voluntary rather than mandatory, to be offered on an individual basis to solve searching problems, understanding the topic, how to write, proofreading—similar to a writing clinic*
- *help needed to improve searching methods*
- *teach critical thinking*
- *Understanding the “science behind it” concept was very complicated, too much, too time-consuming for the non-science student to explore every aspect.*

From the comments, it is clear that the students would like more guidance on the essay topic from the professor, and both generic and course-specific needs have been identified. Based on survey findings and comments from students, the professor provides clearer guidelines for the same course in the subsequent semester and invites subject librarian to prepare a brief introduction based on the context of the essay topic to give non-science students a better insight into the core science literature in order to help them develop better research strategies. At a deeper level, specific resources on fats and molecular structure are introduced to help students zero in on the chemical composition of breast milk. The tendency these days for students to use Google, Wikipedia and other web resources, not only as a pre-search step but to clone whatever is found with little attempt to understand the subject matter is common place. While these students may be bright and prefer self-help, most are unfamiliar with the science resources provided by the library. The professor’s motivation of the learning activity is to stimulate the mind of the students to broaden their science horizon. To enlighten but at the same time allowing the student freedom to explore is deemed beneficial in helping the students acquire the broadened subject expertise needed for this course.

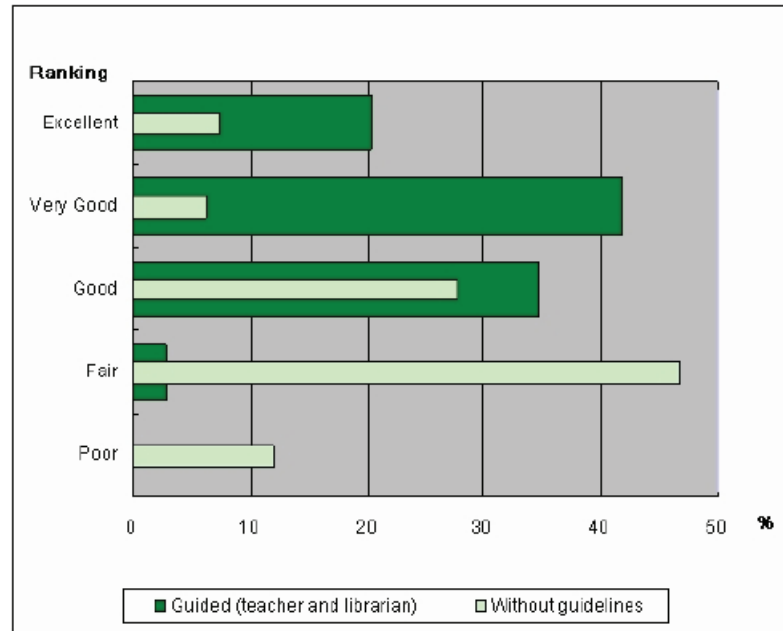


Figure 2: Comparison on the Quality of Essays-- Spring 2008 Essays Unguided; Fall 2008 Essays Guided by Teacher/Librarian

The assessment results of the class of Spring 2008 with 191 students and the subsequent semester's class of Fall 2008 with 241 students given research guidance are compared. The grade/ranking is a sort of reflection on the quality of the essays from both classes. Assessment results show a marked improvement in the Fall semester essays given with guidelines by teacher and librarian, compared with the preceding Spring semester essays given without guidelines (Figure 2). Results suggest some correlation between the improved quality of student research as exhibited in the student's grade on the assignment when students are exposed to a combination of faculty-established guidelines with librarian assistance. Although students' feedback indicates that guidance at a course-specific level is desirable, there is no conclusive finding that the improved learning result achieved by the class of students given clearer guidelines and information research help is solely attributed to the additional instruction. Nevertheless, it can be concluded that mutual understanding and cooperation between the professor and the librarian have been critical in the process to help students achieve the goal of the assignment.

### Strategies in Addressing Learning Challenges

Students from the local schools are all too accustomed to the local traditional style of education in which the learning process tends to be didactic, contrasted with the problem based approach in which learning is more self-directed and students work cooperatively to find solution to real problem/research question. Problem-based research challenge students to dig deeper in context of the real-world scenarios, usually through multimedia projects or

team-based cooperative learning and demand more of students than the classic term paper based on factual information. Most students entering first year perceive that they possess the fundamental information research skills and are able to master research strategies using *Big6tm*<sup>9</sup> or *NoodleTools*<sup>10</sup> and to cite different genres of resources using free web bibliographical tools, such as *EasyBib*<sup>11</sup>. The most significant challenge identified in the study is the ability of the student who is a novice in the field, to track the primary literature to discover and connect with unfamiliar resources beyond one's own discipline. Understanding the topic from a scientific perspective with little science background and deciphering the contextual relevance of the information pose varying degrees of difficulties. Other difficulties identified may be attributed to the students' mixed abilities in assessing the quality and authority of information, writing a scientific paper, mastering the language, time management and critical thinking. While there may still be a need to strengthen generic search skills in basic information research, survey findings inform that there is a far greater need to address the situational context to fulfill course-specific objectives. Indicative from the results of our study, students are more receptive to learning research skills when the skills directly contribute to their learning results.

Moreover, most Hong Kong students face the challenge of English as their second language. The level of English language proficiency also means that in general local students need greater support in writing and communication as a component of the information literacy program, as pointed out in one of the comments. The acceleration toward internationalization means that diverse student backgrounds with differing degrees of both language and information literacy exist. It is not uncommon for a professor at HKU to request an information research session to put everyone on an equal footing right at the beginning of the semester. Currently, support in writing skills is offered by the Centre of Applied English Studies of the university, and some of the subject librarians are already collaborating with teaching consultants from the Centre to embed subject resources into the writing assignments.

To address the class of students of the broadening course surveyed, the subject librarian plays a role to engage students to maximize the retrieval of relevant information. Resources now encompass not only the physical collections, but have expanded to include primary materials from interviews to special collection, and a range of media and web contents that are also part of the knowledge web. Increasing students' awareness of the vast array of resources including empirical or reference data will give them a better insight into the science literature. It is important that students can discern between the value of Google and Wikipedia versus library subscribed resources. The idea is not to spoon feed but to promote self-directed research experience in which the students can begin to refine the research question and start to engage in the process of deep inquiry to discover, decipher, synthesize and use the information ethically to craft their assignment. By encouraging students to ask questions as they explore the best sources and synthesize all the information to draw conclusive findings, they will engage in critical thinking. Often, the professor's concept is not to spend too much time teaching these bright kids but for them to learn science through discovery, which makes the learning process more engaging and creative. The librarian's role is to enlighten the learning process by sense-making through the vast quantity of information and raising awareness of

<sup>9</sup> *Big6tm*. Retrieved March 23, 2010, from <http://www.big6.com/>

<sup>10</sup> *NoodleTools*. Retrieved March 23, 2010, from <http://www.noodletools.com/>

<sup>11</sup> *EasyBib*. Retrieved March 23, 2010, from <http://www.easybib.com/>



high quality resources. The instructional component to teach research strategies is offered through web-based instructional materials and face to face research consultations to connect students with the appropriate digital resources. As time constraint is always a pressing issue with students, filtering search results for more relevant search terms and promoting awareness of specialized resources help to accelerate the research process. Partnering with faculty is crucial to define the contextual needs to ensure relevance.

Recognizing students' collaborative learning modes which utilize a range of Web 2.0 collaborative tools for social networking, knowledge creation and exchange, implementing *Libguides*<sup>12</sup> is the latest effort taken by subject librarians in reaching out via the Web in response to these learning preferences. Subject resources can be accessed through custom-made portals for specific subject groups, which may be a branch library, faculty department, a course or a focus group. Essentially a content management system, *Libguides* provides the platform to amalgamate knowledge and information resources and enables sharing, exchange and discovery of knowledge using 2.0 tools, embedding media and RSS to connect students with the world. *Libguides* can integrate a vast array of research resources, course contents and links to global knowledge set by tabs via a single point of access for most widely-used services. Web 2.0 tools also foster communication and sharing of ideas among the group offering students informal engagement in the discipline. Integration of web logs (blogs) to promote awareness of frontier news in developing fields enhances outreach to faculty, students and researchers, adding another dimension in knowledge exchange about current research and developments in the field. Recognizing that knowledge exchange is critical in fostering intellectual development, innovation and creativity, *Libguides* is also used to showcase faculty's publication output sourced through an RSS feed page from Scopus which posts the latest publications by faculty's subject area. Infusing course or subject specific contents with institutional knowledge assets in research and practice adds value to enrich students' learning experience. Integrating primary resources from special collections will be useful for students to support their opinions as the undergraduate pedagogy shifts to active and experiential learning. Layers of expertise can also be amalgamated into this platform to facilitate collaboration and information sharing/exchange. Other than course contents and digital resources, development of the service layer might include virtual/chat reference, research consultation, concept maps, and social tagging tool, such as *Citeulike*<sup>13</sup>.

### Future Directions

Twenty-first century skills integration and self-motivated learning are becoming the norm in today's learning environment. Understanding learners' behavior and their information and technology needs in the context of ongoing curriculum reform and 21st century modes of learning is the key to transforming services that enable learners to be active participants and contributors.

Library collections and services will envision a wider perspective to encompass knowledge services, where learning is no longer bound by classroom walls within the cyber-infrastructure. Scholarly resources will not only cover traditional publications, but also multimedia, shared

<sup>12</sup> Subject Guides @ The University of Hong Kong Libraries. Retrieved 23 March, 2010, from <http://libguides.lib.hku.hk/home>

<sup>13</sup> Springer. (n.d.). *Citeulike*. Retrieved March 23, 2010, from <http://www.citeulike.org>

global digital collections held by the world's leading institutions, open-access of knowledge repositories, databanks of scientific data, specialized knowledge websites created by experts, news podcasts, and open courseware, etc. Services that utilize a web-enabled infrastructure to acquire, exchange and share knowledge will extend far beyond the physical collections to engage learners in connections across the disciplines. Subject librarians will develop expertise in fostering the research inquiry, engage in research consultation for historical and current resources that embrace all formats, and be equipped with skills in multimedia projects, empirical analysis and managing bibliographies to contribute to student learning.

The survey findings inform that searching for the relevant context poses one of the greatest challenges. Students value research assistance most when given in a situational context which will accelerate learning and help them achieve the learning results. The knowledge services will place emphasis on developing skills that help students discover context-rich resources to promote thinking and creation. To inculcate course contents with knowledge assets, such as faculty's own research and working papers, shared learning objects and weblogs created by research communities, will facilitate wider knowledge sharing and exchange. In nurturing the skills of students to identify appropriate resources for their learning needs, the collaboration between faculty and subject librarian is deemed essential.

The learning commons concept will continue to evolve with the aims of revitalizing and transforming academic services support and knowledge inquiry. The emerging service will shift towards an approach that is collaborative, innovative, interactive with media, visual, and mobile tools to create an engaging informal environment in which to foster twenty-first century skills and learning styles. Services need to be both physical and virtual, and are preferred to be conveniently embedded into students' workflow "just in time." The library as learning and research portal and ICT environments will converge with the latest tools and skills expertise, blending technology with contextual contents to support a wide range of learning activities and knowledge creation.

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## About the Author

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The presenter is currently Head of Collection Development at the University of Hong Kong Libraries and has held this position since 2002. She provides leadership and strategic direction in the area of collections and digital resources by leading a team of subject and specialist librarians who work in close consultation with the faculty to shape the libraries collections and to connect students with the appropriate information resources. She has oversight of an annual materials budget of US\$12 million and is responsible in establishing a sustainable strategy that meets collection goals. As an operational team leader, she serves in the Quality Assurance Team to assist with the planning and execution of strategic priorities. Areas of professional interest and expertise include: scholarly communication and its impact on collection development, materials budget planning, return on investment, shifting role of collection development librarians, knowledge exchange and knowledge management for student learning and faculty research, preservation.