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Preparing for the future – academic libraries in the beginning of the 21st Century

Choy Fatt Cheong (Nanyang Technological University)

Abstract

One of the key components in any university or academic institution is its library. Since the early history of universities, particularly after the German model became well established, academic libraries were considered to be central to the mission of universities. Today, globalization, the Internet and rapid technological changes have a profound impact on the future roles of academic libraries and their centrality. This paper discusses some of the major developments that are likely to affect the future of libraries, such as the trend towards constructivist learning approaches, changes in scholarly communication, easy and greater access to bewildering variety of information sources, etc.

Introduction

In his book, “The story of libraries”, Fred Lerner recounts a Yale legend, “ten prominent Connecticut ministers gathered in 1699, each bringing a number of books which he laid on the table saying “I give these books for the founding of a College in this Colony” (Lerner, 1998)

In the short anecdote are two key ideas about academic libraries and universities.

The first is the centrality of book collections, and thus libraries in the making of a university in the 17th Century. Books are fodder to the intellect, without which ideas and knowledge cannot be transferred, transmitted and acquired. In today’s context, where there are a multitude of materials and resources that would have served the purpose of books in the 17th Century, there is no doubt that the vehicle for transmitting knowledge still plays a central role in the functioning of a university. In examining the future of academic libraries, the question is whether this role has shifted elsewhere or is still very much a unique function of libraries.

The second idea is the benefit of pooling and sharing. It is always much cheaper and more valuable to pool resources for common use. Ten dollars each from 10,000 students pooled together will provide access to thousands of resources for all students, whereas on their own, 10 dollars can barely buy a book. This idea is not unique to libraries and is so fundamental that it underpins almost all aspects of our lives, from education to taxation. The question for libraries is whether we will continue to be the “pooling” agent for information resources or will another agent, such as commercial vendors, take over this function.

Using these two basic ideas as an initial springboard, this paper examines some issues that are likely to affect the future of academic libraries.

Fundamental roles of universities

The future of academic libraries is dependent on the future of universities. The information and communication revolution in the last decade have created many new scenarios for universities to ponder. E-learning, open learning, digital libraries, collaboratories and strategic alliances are some of the buzzwords we hear today. However, whatever the future scenario, it is likely that the role of universities in learning and research will remain fundamental to their mission. What will probably change will be the mode, scale and ways in which we engage in learning, teaching and research.
To stay relevant, academic libraries must therefore ensure that they play a critical, if not an essential role in these activities - that without libraries, learning and research will be very much impaired. This paper will examine some trends in learning and research and discuss how they are likely to impact on the work of libraries in the future.

Trends in learning

A look at the course outlines in many universities today will show that the content-centered approach to learning is still fairly dominant. This is manifested in the lecture-tutorial system, together with recommended book lists and the familiar assessment regime. Professors deliver content and students absorb what is dished out and then prove their mastery of the subject in formal examinations. However, the continued rapid development in communication technology and the now ubiquitous Internet will ensure that this situation will not hold up much longer. Today, both students and teachers have easy access to a huge variety of information (the good as well as the bad) instantaneously. In less than 10 years, the information landscape has changed from a situation of scarcity to abundance and the information seeking process from finding to evaluation and selection. The knowledge asymmetry that exists between teacher and students is continuously leveling, and this has to have a significant impact on the process and delivery of learning. The following are a selection of some developments in learning trends.

Content-centered to Learner-centered

Many educators now are moving away from the stimulus-response, behaviorist approach to a more learner-centered, constructivist approach in delivering teaching and learning. Constructivism believes that students actively construct their own knowledge on a subject rather than passively receiving it from their teacher. It recognizes that the learner starts off with his own preconceived ideas of the world and then continuously interpret, organize, reflect and construct his knowledge as he explore and seek understanding of the information and the environment around him. The learner will therefore look for content as and when he requires it to resolve a learning situation instead of having pre-determined content fed to him by the teacher. In fact, this way of learning closely mirrors real life situations.

One-time learning to Life-long learning

The crackling pace of change in all academic disciplines and professions, aided and abetted by the new communication infrastructure has considerably shortened the half-life of information and knowledge. The rapid obsolescence of knowledge has led to the realization that life-long learning is not only important to the soul but also to economic survival. We thus have to be perpetual students in the course of our lifetime. Universities will no doubt want to take a share of the life-long learning pie as more players such as corporate universities and virtual universities enter the fray. Alumni could become “life-long students” of their universities and the boundary defining what constitute student population will expand considerably. As a result, demand for support services such as library resources and computing facilities will increase.

Industrial age mindset to information age mindset

The learning environment has changed and so has the learner. It is widely observed that students today have different behavioral patterns from the previous generation ever since information and communication technology became inextricably entwined in our daily lives. Jason Frand (2000) describes some of the characteristics of students today as the “information-age mindset”. Although these are not based on firm empirical evidence, we can nevertheless recognize some of these observations. For example, it is not difficult to agree that “students are using the Web as their primary (if not sole) source of information” and they “believe that everything they need to know is on the Web and it’s all free”.
According to Frand, students also prefer to learn by trial and error rather than through a systematic investigative approach (which requires more time and effort). Similarly to save time they are experts in multi-tasking. They need to stay connected all the time and be “in touch anyplace, anytime - even in the middle of a classroom”. In a 24/7 world, where things are expected to happen instantaneously, they have zero tolerance for delays. Given these characteristics, it is quite certain that the manner in which the new generation undertakes learning activities will be vastly different from their parents.

Online access and Library as a place

As students and academic staff rely more on the Internet and other online resources provided by libraries or others, it seem logical to expect less frequent visits to the physical library. Indeed findings from LibQUAL+™ survey administered at ARL universities from 2003-2004 (Lippincott and Kyrillidou, 2004) showed that 67% of more than 9,000 undergraduates surveyed get information from search engines on a daily basis. This is 3 times the number who reported using the library on premises daily. In 2001, Scott Carlson's article “The Deserted Library” in the Chronicle of Higher Education (Carlson, 2001) painted a bleak picture of declining gate counts in some academic libraries due to greater availability of online resources which students and academic staff could conveniently access elsewhere at home or in their offices. The article provoked many responses from librarians who countered with healthy gate count figures in their own libraries that do not bear out the trends described in the article. Librarians also pointed out that new library building projects in the U.S. have increased rather than declined. As these are expensive undertakings, it must be taken as a vote of confidence on the need for physical facilities. If we assume that student visit libraries to use information resources only, then it would be right to expect visits to drop drastically. However people use libraries for many other reasons too - for its ambience, to meet others, to study and reflect, to collaborate, etc. These are not trivial reasons and do in fact contribute significantly to problem solving and learning outcomes.

Individual learning to collaborative learning

Due to the confluence of a number of educational, social and technological trends, collaborative learning has become a much more dominant mode of activity for learners. The more complex the world, the more necessity to collaborate so that learning tasks could be distributed or shared for mutual benefit. Unlike the past, there is also greater emphasis on team work and group work, reflecting the reality in the workplace.

The new learning environment and its Impact on libraries

Libraries will play a critical role when learner-centered approaches in our universities take root and become common practice. Libraries are the natural ally of constructivist and life-long learning. Traditional education is prescriptive; it lays down what students ought to learn by specifying curriculum, syllabi and reading lists. Many academic libraries support this approach by building reserve book rooms and even preparing or subscribing to electronic course packs, and generally acting as a free bookshop for students. Constructivist method of teaching and learning, such as problem-based and self-directed learning are much less prescriptive. In general, a problem or a learning outcome is defined for students and they are expected to carry out systematic processes to solve the problem or attain the learning outcome.

Responding to constructivist learning approach

To successfully implement constructivist programmes, students must have access to a wide range of learning resources with which they can explore and discover information to apply to their problem solving and learning tasks. Libraries fit perfectly into such an environment - after all, libraries are conceived, designed and structured to encourage self-directed and
life-long learning. In many ways, such an approach to learning is not unfamiliar in a university environment, as this is an activity that academic staff and researchers engage in on a daily basis in their research work. However, in contrast with content-based teaching, the learner-centered approach requires teaching staff to spend much more time focusing on the process of learning rather than delivering content (i.e. giving lectures). Thus they will play a more intense facilitating and guidance role than before. As one major component of learning is the seeking and gathering of information, libraries will also need to realign their services to meet this new method of teaching and learning.

Illustration : Republic Polytechnic

Republic Polytechnic, the newest of 5 polytechnics in Singapore embarked on a bold pedagogical approach when it was first set up in 2002. All the courses in the polytechnic are taught using the problem-based approach. Students “work in teams throughout each day to build various approaches and solutions to the problems they receive. A holistic assessment approach that includes daily reflections and peer evaluations is complemented by regular facilitator feedback to help our students improve” (http://www.rp.edu.sg/about/pbl/index.asp). One of the phenomena that the Librarian of Republic Polytechnic noticed was the rapid turnover of books and library materials throughout the day. For example, a large volume of books were borrowed at the start of the day (when project problems were assigned) and returned once the projects were completed. The Librarian also noted the need to build a wide collection to cater to the often unpredictable needs of students engaged in problem solving.

Impact on use of library and collection development

Anecdotal evidence from examples such as Republic Polytechnic suggests that in a learner-centered environment, usage of the Library is likely to increase, with quick turnaround in consultation of materials as students demand information to solve real problems as and when needed, rather than for the traditional practice of studying for tests and examinations. As information on demand becomes the norm, academic libraries will have to design its services and collection closer to the special library model, where turnaround time for meeting information needs is a critical service indicator.

There will also be a change in approach to collection development in the learner-centered library. Libraries will not be able to rely on clearly drafted syllabi or curriculum materials to help them develop collections. Instead, librarians will have to have greater awareness and understanding of the learning outcomes, goals and objectives of the academic programmes they support in order to select and acquire appropriate and relevant materials. It will be a much more difficult and uncertain task. Libraries will also have to emphasize much more on collecting supporting secondary literature to support students in independent learning. Learner-centered collections will also need to be broader in scope to meet the dynamic needs of students.

Change in the roles of librarians

It is obvious that students in such an environment will need to develop a higher competency in information literacy in order to succeed in their learning. The Library therefore has the opportunity to demonstrate their expertise in information work and contribute directly to the educational outcome of students through instructional support and more intense student guidance activities. In a learner-centered environment, librarians will need to interact more with their users and have better understanding of their information seeking and problem solving behavior. As discussed earlier, both academic staff and librarians will have to spend more time and effort in facilitating the learning needs of students. Thus their roles will intersect much more than before and this will promote a collegial and collaborative relationship.
Catering to extended student population

Academic libraries will probably need to cater to a more diverse student population when universities extend their boundaries to incorporate “life-long learners”. These may be local or international participants since we live in the global village. Their profile will be quite different from the traditional students and staff that academic libraries are familiar with. The diversity of needs will require academic libraries to redesign the way they deliver their services. For example, distance learning components will likely be commonplace and libraries will need to provide adequate support virtually. New models will need to be worked out and negotiated for vendor services based on FTE (full-time-equivalent) calculations as life-long learners taken in are likely to be transient students.

Library as a place

Physical libraries will continue to be important fixtures in the future campus for the simple reason that they are an important social and community space in addition to being depositories of books and other information objects. In a hybrid library where many media co-exist, space is essential to mediate between users, collection and services. Even when everything has gone completely electronic, we will still have to invent new spaces to cater to other aspects of learning. Learning is a social and multi-dimensional activity that relies on human interaction, multiple senses, chance encounters and serendipity for it to be effectively carried out. Libraries are special community spaces, with powerful symbolic and cultural connotation of learning, intellectual freedom and optimism. There is no other more potent place to engage in study and learning.

We should take the cue from our observation of users’ behavior in catering to future physical libraries or library space. The increasing adoption of collaborative approach to learning demands a different approach to designing our library space. Seats and space would most likely be designed and built to facilitate discussion and collaborative work between learners. This will lead to a different ambience in the library from what we are used to today. It will probably be much noisier, with more activity and equipped with more gadgets and service points (manned or unmanned). At the same time, libraries will also need to cater to traditional needs for a conducive environment for study and reflection. It will be an interesting architectural and planning challenge to cater to such competing requirements. The academic library of the future will be designed with a focus on creating useful, innovative and attractive space for users rather than solely for physical collections.

Thus, if the physical campus is to continue to exist in the future, it will be functionally and symbolically incomplete without a library building or facility. The campus library generates traffic and buzz to the space around it. That is why many student activities such as concerts and bazaars are often held near the library, at least in Singapore’s institutions of higher learning.

Trends in research

The other key role that we expect of universities is research - the contribution of new knowledge and understanding about the world through systematic investigation, discovery and invention. Success in research brings tangible benefits to universities in terms of wider recognition, increasing enrollment, higher funding and grants, revenue and business and entrepreneurial opportunities. It will also create a better learning environment for students, enabling them to participate actively in the frontier work of knowledge creation. As with learning, information and communication technology have created new scenarios in which research work in done, particularly in the scholarly communication system.
Scholarly communication

Research activities occur within the framework of scholarly communication. This framework, traditionally based on journal publications and books, serves many functions in academe - such as providing quality control, lending legitimacy, establishing priority and dissemination of research work. In many cases, it also forms the basis on which the academic reward system operates. One peculiar characteristic of the system is that a large portion of the scholarly communication activity is funded by the universities themselves, from paying the salaries of the researchers who publish their paper in journals for free (and often surrendering their copyright) to financing their libraries in purchasing the expensive journals.

In recent years, the scholarly communication system has been widely discussed as a result of serious challenges on the economic and technological fronts. The so-called “scholarly communication crisis” (the continued escalating costs of journal subscriptions) takes center stage, as it seriously undermines libraries’ financial ability to sustain their services. The development of open access journals and other similar initiatives and movements are gathering steam to meet these challenges. However, the current system is very entrenched and it will take some time before we see a clear trend. At the same time technology has also transformed the way in which the scholarly communication system works. Most of these changes center on the transformation of the scholarly publication.

The scholarly publication

The scholarly publication is the heart of the scholarly communication system. Research recorded and transmitted through a “proper” scholarly publication ensures that it circulates within the system and has the potential to generate the desired impact in its field and recognition for its author. To be recognized as a scholarly publication, a work must fulfill a number of criteria, such as those proposed in a study by Leah Halliday (2001). She listed these under the categories of trustworthiness, publicity and accessibility. For example, a scholarly publication must be intended to be publicly available in a durable form over the long term. It must be durably recorded, reliably accessible and retrievable over time. It should have stable identifiers and have metadata containing a minimum set of information. “To satisfy all potential interest, trustworthiness should be based on ‘institutionalized’ measures such as peer review rather than on personal knowledge”.

As more scholars utilize the power of information and communication technology to harness, analyze, present and disseminate their work, we will probably encounter an increasing variety of works that may not fulfill the criteria of what is acceptable as proper “scholarly publications” as listed by Halliday.

Changes in the nature of scholarly publications

Abby Smith (2003) provided some examples of such new scholarly materials, an example of which is *Monuments and Dust*, a work by an international group of scholars “assembling a complex visual, textual, and statistical representation of Victorian London” [http://www.iath.virginia.edu/london/](http://www.iath.virginia.edu/london/). The work comprised a variety of formats, including text, statistical tables, maps and 3-D images. You could use a VRML viewer to “fly” or “walk” about in the Crystal Palace of Victorian London. As impressive as it is, Smith thinks that “until the digital preservation community develops and promotes preservation standards in areas such as these, *Monuments and Dust* and other similar projects are fated to be ephemeral”.

Smith (2003) further noted that “the digital objects created are often complex, composed of heterogeneous types, open ended, and resistant to closure and to normalization. Moreover, the functionalities that scholars prize may often be at odds with emerging best practices for preservation as well as with one another.”
Thus the form in which these works are created and used are likely to pose considerable difficulties in preserving them for future reference and use, which is a requirement for academic scholarship. Unlike current journal articles or books, where the act of publication “deposits” the work in the collective memory and fulfill a key requirement of scholarship, newer forms of scholastic work may fall out of the orbit of our collective memory.

Collaborative work in research

The example of the work on Victorian London in *Monuments and Dust* given above also illustrates another phenomenon that is becoming part and parcel of everyday academic life. Information and communication technology has enabled scholars and others to collaborate in very effective ways regardless of the physical and temporal distance that separates them. Instant access to common virtual workspace, resources and even equipment has given scholars the facility to work with their global partners thousands of miles away as though they are beside each other in a laboratory. New terms, such as collaboratories, grid communities, cyberinfrastructure-enabled knowledge communities (CKCs) have been coined to describe such communities. Software and technology has been developed to facilitate such collaborative work environment. Besides the growing number of research groups working on collaboratories, universities themselves are also forming alliances and joint programmes to maximize their respective strength in offering innovative programmes to local and international students.

Impact of developments in learning and research on libraries

There is no doubt that scholarly communication is undergoing profound changes due to the rapid increase in scholarly activities worldwide as well as technological development as discussed in the examples above. Academic libraries have a strong interest in these developments, as they are a vital part and parcel of the scholarly communication system.

Open access

Many hopes are pinned on the open access movement to help ease the “serials crisis”. Though there are signs of some leveling of serials prices costs (Case, 2002), it is still in its early days. It is not clear for example, whether the open access movement can be sustained financially in the long run as the cost of publishing is not insignificant, whether the model is author-pay, reader-pay or shades in between. A critical success factor is the wide spread acceptance of scholars in publishing their output in open access sources. In principle, libraries must support the open access movement. The failure of the open access movement will lead to an imbalance of commercial and public interests that will be detrimental to the scholarly communication system and libraries.

In the future, most academic libraries are likely to build their OAI complaint electronic repositories to archive and manage the publications of their university community. These will contain self-archived papers, theses, preprints, etc. These repositories will act as trusted sources (by virtue of the fact that it originated from reputable institutions), with documents properly tagged for preservation and retrieval by the institution’s library. A network of these repositories will exist worldwide and search engines will provide the research communities with systematic access to a large portion of scholarly publications and other academic output.

Preservation of knowledge

All libraries have essential knowledge transfer roles within the sectors or client group they operate. For national libraries, their key role is the preservation of their countries’ published heritage. Likewise, in principle, academic libraries should ensure that their parent universities’ intellectual output is preserved and accessible for use.
Academic libraries would have to invest in more effort to manage the new forms of scholarly communication described earlier. There are serious technical and conceptual problems in dealing with such works due to their dynamic and diverse nature. Often such "publications" contain a mix of digital object types with varying degree of permanence and importance to scholarship. Some parts of them may only be used with external software (another preservation issue) while other parts are highly interactive. Apart from technical and conceptual issues, there are also organizational issues to contend with. Many of them are collaborative ventures across institutions and responsibilities for their preservation and continued access must be negotiated with many parties. Smith (2003) provides a good account of these issues and development in her report for CLIR.

Due to the complexity and novelty of digital preservation, academic libraries are likely to work in close collaboration and partnership with each other and even with other institutions. Furthermore, as many areas require intensive research and development effort, only a few academic libraries and institutions have the resources to seriously engage in studying and resolving these challenges.

Libraries’ role in knowledge transfer

Both learning and research are dependent on the availability of a mechanism or system that stores, transfers and transmits knowledge. No effective learning or research can take place without this mechanism. This is because learning and research are cumulative activities. Progress in learning and research depends on prior progress made and the knowledge transfer mechanism is necessary for cumulative knowledge to be used effectively. In the last few centuries, books and later journals play the dominant role in the storage, transfer and transmission of knowledge. Since the thirteenth century, the chests of books in ancient universities have grown into millions of volumes that saw the rise of present day academic libraries.

In a print dominant world, libraries were seen as essential to the enterprise of universities because of their primary role in maintaining this knowledge transfer mechanism through ownership and provision of access to books and printed materials. Students and academics are reliant on libraries as they are the only place where they can use this knowledge transfer mechanism effectively.

Alternatives to libraries?

In the electronic and Internet world today, the physical library has become just one of several nodes of information access. Information resources, particularly the electronic variety, are now highly distributed and easily accessible through search engines and interfaces provided by commercial as well as non-commercial organizations. Anyone can now set up shop to offer students direct access to information resources without them having to go through libraries. Good examples are companies like Questia (which bill itself as the world’s largest online academic library). It provides 50,000 book titles and 400,000 journal articles at US$109.95 per year to the individual subscriber (http://www.questia.com/). According to news report (Snoddy, 2004), subscribers “come from 181 countries including Mongolia, Chad and Surinam. About 80 per cent are from the US and 5 per cent from the UK”.

Services like Questia has all the advantages of electronic services - 24/7 accessibility, space-saving, ease-of-use, concurrent access, quick updates, low maintainability, full-text search capabilities, etc., - in other words, all the convenience that impatient users desire of a library. It is not difficult to see why it appeals so much to the administrator in us. It was reported that at least one high school in U.S. has closed its physical library and replaced it with subscription to Questia (“Student library”, 2004).
Google’s digitization plan

Creating a much greater wave is the recent announcement by Google that it is digitizing the collection of some of the world’s most well known academic libraries. According to the New York Times (Markoff & Wyatt, 2004), “Google plans to digitize nearly all the eight million books in Stanford’s collection and the seven million at Michigan. The Harvard project will initially be limited to only about 40,000 volumes. The scanning at Bodleian Library at Oxford will be limited to an unspecified number of books published before 1900, while the New York Public Library project will involve fragile material not under copyright that library officials said would be of interest primarily to scholars.”

These developments clearly illustrate that libraries today no longer have monopoly over access to published information or the collection memory of humankind. Will this then diminish or obliterate the role of libraries?

Selection roles

A key idea of a library is that it acts as a filter for all possible information resources and selects those that are relevant to a specific group of users. The selection role of libraries is necessary mainly for economic and technical reasons. It costs money to provide access to information, and therefore selection is an act of allocation of scarce resources. Selection also helps users to manage their information overload so that they are not crowded with irrelevant resources that will affect their ability to use information effectively and efficiently. Thus libraries spent considerable amount of their energy and intellectual effort in collection development to ensure that the information needs of their clientele are met adequately within the available financial resources. How do these roles square in with the new environment described above?

Many of the services provided by vendors such as Questia are one-size fit all solutions. Their scope and content coverage may be fairly well defined, but they do not select resources for inclusion base on the need of any specific institution or group of users. For example, in the case of Questia, the focus is on humanities and social sciences, “because the material does not date as quickly as science, technology and medicine (STM) publications and because STM is relatively more expensive” (Snoody, 2004). The decision on selection is clearly influenced by business concerns. They are therefore basically a solution in search of a problem, so to speak. Its content is unlikely to meet the total needs of a typical academic library. In contrast, libraries build collections that are tailored to the learning and research needs of their users and are able to adjust as needs change. This is almost impossible in package deals.

In fact, we should think of Questia (or any similar online “libraries”) as one of many information resources available, rather than as an alternative to libraries. Information resources like Questia are just another “book” or “electronic resource” to consider in libraries’ collection development plans.

Economic aspects

In Google’s case, beyond the attention grabbing headline is the fact that only out-of-copyright materials are likely to be made freely available for view. Materials with existing copyright protection (and there are a lots of them) are most unlikely to be freely available on the Internet, otherwise publishers will go out of business and there will be no more books to be continually added to the pile. Apparently, Google will digitally scan in these materials (a clear copyright violation) but display only a few pages to tantalize the reader and then provide a prompt to link to online booksellers to purchase the book, or (probably) ask for some payment before releasing the rest of the pages. In essence, users will still have to pay to view the majority of the digitized collection. As such, Google is no panacea or replacement for libraries. Sergey Brin and Larry Page (Google's founders) vow “to make all of the world’s
information accessible to anyone with a Web browser” will always come with a price for the consumer.

If Google succeeds (some people do have doubts after using simple arithmetic to calculate the rate of scanning), and millions of books are made digitally available online, it will still be unrealistic to expect students or professors to pay a tidy sum for every copyrighted book they want to read through Google. That is when libraries come in to perform their ancient role of pooling resources for use. Just as libraries subscribe to the hundreds of databases today, they will also probably subscribe to Google’s (or its partners’) paid service if they meet the needs of a library’s clientele.

Libraries as aggregators

Libraries are therefore the mother of all aggregators. In a complex environment, somebody has to be in charge of coordinating resources and matching them to real needs so as to deliver the positive outcome of learning and research for a university.

What about all the free information resources we can get on the Internet? What role is there for libraries here? Will these ever be “good” enough for users to by-pass other fee-based resources and thus further diminish the need for libraries? The increasing number of open access journals and “quality materials” will no doubt add to the usefulness. The total number of resources on the Internet, both good and poor quality, will probably follow the doubling law. Internet users will be faced with a bewildering choice. Many articles have been written on how libraries can remain important players in “the Internet is the Library” scenario. For example, it has been suggested that libraries have important roles to play in organizing and structuring information on the Internet, helping people navigate it, providing guidance and instruction on evaluating and using information, etc. Whether these effort are successful or not depend really on how Internet users perceive the effectiveness of libraries in helping them utilize the Internet. The challenge is for libraries and librarians to make their presence felt on the Internet.

Conclusion

Universities are measured chiefly by their ability to deliver effective learning outcomes for their students and by their prowess in discovering and inventing new knowledge through research for their community and society at large. All functional units or components of a university must have important roles to play in supporting these 2 functions if they are to continue to exist in the future. As we have seen, the learning and research environment has been dramatically altered by rapid advances in information and communication technology. On the surface, some of these developments seem to spell the death knell for libraries or significantly diminish their roles. Many people like to believe that eventually, we can just make do with a box with a screen for all our learning and research needs. This is understandable as we all have a natural desire to reduce complexity, increase convenience and get information for free if possible. However the real world is often more complex than we like and it is in the natural order of things that it will continue to be more complex than before. In most cases, new technological developments are rarely complete alternatives of libraries. Most of the time, they complement and strengthen present roles. Otherwise they usually are incorporated into the library scheme of things. Academic libraries provide services that help students and academics reduce, or at least deal with such complexities more effectively. As long as learning and research require access to cumulated knowledge and information resources, academic libraries will always have important roles to play.
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