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THE ACADEMIC LIBRARY MEETS WEB 2.0 :

APPLICATIONS AND IMPLICATIONS

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1 INTRODUCTION

Ces dernières années, le monde des bibliothèques a pris une voie résolument tournée vers l'avenir. En effet, le fait d'y intégrer les nouvelles technologies dont nous disposons à l'heure actuelle permet d'élargir considérablement leur portée, en plus d'amener une solution au problème de l'espace de stockage limité pour les collections. Mais les possibilités ne s'arrêtent pas là, et c'est sur ce sujet que se sont penchés les auteurs de l'article que nous avons choisi d'étudier dans ce travail. Ceux-ci se sont attachés à voir en quoi les outils du Web 2.0 pouvaient être adaptés aux bibliothèques pour les rendre plus performantes. Ainsi, après avoir étudié les sites Web de 81 bibliothèques universitaires américaines situées dans l'état de New-York, ces chercheurs proposent un modèle conceptuel de « Bibliothèque 2.0 ».

Afin de garantir une compréhension optimale des tenants et aboutissants de cette étude, les termes spécifiques et techniques soulignés dans ces quelques pages se trouvent explicités dans le glossaire en page 6.

2 RÉSUMÉ DE L'ARTICLE

C'est pour soutenir la révolution que constitue la Bibliothèque 2.0 que sont entrepris des efforts pour adapter les bibliothèques, et plus précisément leurs sites Web, aux outils qu'offre le Web 2.0. Parmi eux, on trouve les blogs, les messageries instantanées (instant messaging), le partage d'informations dont les podcasts (information sharing), les flux RSS, le bookmarking social, les réseaux sociaux (social networks), les communautés virtuelles (virtual communities) et les wikis.

L'article étudié est basé sur l'examen des sites Web de 81 bibliothèques universitaires dans le but d'y relever la présence de dispositifs issus du Web 2.0 et de voir comment ceux-ci ont été appliqués à la gestion de la bibliothèque ; les résultats furent ensuite analysés quantitativement et qualitativement pour élaborer et proposer un modèle conceptuel de Bibliothèque Universitaire 2.0. De prime abord, les résultats montrent que seuls 42% des sites en question étaient équipés de ce type d'outils[1], qui facilitent pourtant la gestion et les services de la bibliothèque de différentes manières ; l'alliance de plusieurs d'entre eux est fréquente puisque chacun présente des fonctionnalités propres. La messagerie instantanée (IM) est utilisée comme voie de communication alternative entre bibliothécaires et utilisateurs, ou entre ces derniers. Ils peuvent ainsi interroger les bibliothécaires en temps réel, où qu'ils soient, et se répondre entre eux, ce qui illustre très bien le principe participatif du Web 2.0. Les blogs sont surtout utilisés comme bulletins d'informations auxquels les internautes peuvent réagir via les commentaires associés aux articles. De plus en plus, ils sont utilisés conjointement avec d'autres outils, comme les tags ou la syndication, qui permet aux utilisateurs comme aux bibliothécaires de se tenir informés. Si les tags sont relativement peu présents dans cette étude, ils présentent néanmoins un large potentiel ; leur utilisation permettant aux utilisateurs d'indexer ce qu'ils consultent au moyen de mots-clefs ou de phrases. Leur présence a été relevée uniquement dans le domaine des blogs, bien que la mise en place d'un tel dispositif au sein d'un catalogue de type OPAC puisse se révéler d'un grand intérêt. Le wiki, quant à lui, met en pratique le principe sur lequel repose la gestion participative des bibliothèques puisqu'il permet aux utilisateurs d'apporter leur contribution aux contenus. Contrairement aux listes de diffusion (mailing lists), les réseaux sociaux (social networks) permettent des activités en temps réel comme en différé. Enfin, le podcast semble avoir des possibilités plus limitées qui consistent essentiellement en émissions de radio. Les emplois relevés des dispositifs que nous venons de citer sont résumés dans le tableau 1[2]. On notera que si ces applications varient selon les

[1] Le détail de leur fréquence d'utilisation est donné dans la figure 2 (p. 16).
[2] Cf. p. 18.

institutions, elles sont essentiellement utilisées par les libraires, les usagers n'y étant pas encore familiers.

La présence de tels outils permet à l'utilisateur d'aller lui-même chercher l'information au moyen de différentes interfaces et plus uniquement auprès des bibliothécaires. En plus de cela, la Bibliothèque 2.0 rend le lecteur actif puisqu'il devient aussi contributeur ; les caractéristiques de celle-ci sont d'être ouverte au développement, interactive, convergente pour orchestrer les différents outils, collaborative et participative. La Bibliothèque Universitaire 2.0 s'articule autour de trois axes : le Bibliothécaire 2.0, l'Utilisateur 2.0 et l'Information 2.0 ; elle implique que le personnel soit plus polyvalent qu'auparavant[3] puisqu'il doit, en plus de ses multiples tâches propres au métier de bibliothécaire, être le lien entre bibliothèque et utilisateurs au moyen de la plateforme Web 2.0. L'utilisateur, devenant actif, aura un rôle variable selon le groupe auquel il appartient[4]. Enfin, l'information se présentent de façon tout à fait différente[5], notamment parce qu'elle n'est plus linéaire comme elle l'était jadis, ou encore parce qu'elle ne vient plus nécessairement du bibliothécaire. Le modèle théorique proposé s'articule donc autour des trois dimensions précédemment citées[6] mais n'a pour ambition que de constituer un premier pas dans les efforts d'adaptation des bibliothèques.

[3] Cf. tableau 2 (p. 19).
[4] Cf. tableau 3 (p. 19).
[5] Cf. tableau 4 (p. 19).
[6] Cf. figure 6 (p. 20).

3 COMMENTAIRE PERSONNEL ET CRITIQUE

Encore plus que les autres institutions, la bibliothèque universitaire doit vivre avec son temps et se donner les moyens techniques et technologiques d'être toujours plus performante, c'est pourquoi la mise en place d'outils tels que ceux qu'offre le Web 2.0 est si importante. À l'heure actuelle, le public est plus que jamais demandeur de rapidité, d'efficacité et d'interactivité, qui sont des caractéristiques de la Bibliothèque 2.0. Sans entrer dans les détails, les innovations qu'elle propose l'éloignent de l'image pénible et assommante qu'elle pouvait avoir dans l'esprit du public, tout en l'amenant à devenir un pôle *actif* des plus essentiels sur le campus.

Cependant, il faut être conscient qu'une telle révolution présente de lourdes implications : non seulement la mise en place des dispositifs est un travail technique conséquent, mais il faudra ensuite former les bibliothécaires comme les utilisateurs, chacun à leur niveau (étudiants, professeurs, chercheurs, etc.). Les fonctionnalités participatives comme les tags, qui paraissent être le dispositif bénéficiant du plus large potentiel, ou encore le wiki nécessitent une vérification pour s'assurer qu'elles sont utilisées à bon escient, afin de ne pas véhiculer de données erronées. Enfin, toutes les applications abordées ne sont pas forcément essentielles. La messagerie instantanée, par exemple, semble d'un intérêt assez limité compte tenu de la nécessité d'avoir un bibliothécaire connecté en permanence sur le chat, alors qu'un forum de discussion pourrait être beaucoup plus intéressant (malgré la perte de l'instantanéité), ce qui n'est absolument pas abordé dans l'article.

4 GLOSSAIRE

Blog, blogging : Contraction des termes *Web* et *log* ; un blog, aussi appelé weblog, est un site Internet personnel (qui peut cependant avoir plusieurs auteurs) qui permet la publication d'articles que les visiteurs peuvent commenter, et donc l'interactivité.

Branch Library : Bibliothèque thématique, comme par exemple la Bibliothèque des Sciences de la Santé de l'ULB, sur le campus Érasme.

Communally innovative : L'auteur de l'article[7] évoquant cette caractéristique du Web 2.0 définit cette notion comme reposant sur la base des bibliothèques en tant que service à la communauté, mais impliquant que, pour accompagner les changements de la société, les bibliothèques doivent non seulement changer avec elle, mais également permettre aux utilisateurs de changer la bibliothèque elle-même. Ainsi, elle doit continuellement chercher à améliorer ses services pour trouver de nouveaux moyens de permettre aux communautés comme aux individus de rechercher, trouver et utiliser l'information[8].

Folksonomy : Terme issu de la contraction des mots *folks*[9] et *taxonomy*[10]. Il s'agit d'une méthode collaborative de classification de contenus au moyen de tags, effectuée par une communauté d'internautes. Leur transposition visuelle consiste en un nuage de tags (*tag cloud*).

Forum : Un forum est un espace de discussion où les conversations, appelées fils de discussions, sont souvent organisées par thématiques et restent accessibles à tous, contrairement aux messageries instantanées. Il est géré par un administrateur éventuellement secondé par des modérateurs.

Information sharing : Le principe du partage d'informations en matière de Web 2.0 est très bien illustré par le site *Yahoo ! Questions/Réponses*[11], un site où les internautes choisissent une catégorie au sujet de laquelle ils souhaitent poser une question à laquelle leurs pairs sont invités à répondre. Le terme peut aussi englober le partage de contenus comme le permettent des sites comme YouTube[12] et Flickr[13] pour le partage respectivement de vidéos et de photos.

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[7] Jack M. MANESS, « Library 2.0 Theory : Web 2.0 and its Implications for Libraries », *Webology*, vol. 3/2 (June 2006), http://www.webology.ir/2006/v3n2/a25.html
[8] *Idem*.
[9] En français, « potes ».
[10] En français, « taxinomie » : la science du classement.
[11] http://fr.answers.yahoo.com
[12] http://www.youtube.com
[13] http://www.flickr.com

Instant messaging (IM) : La messagerie instantanée, parfois appelée *chat* ou *tchat*, permet à différents internautes d'échanger en temps réel des messages textuels, mais aussi des contenus numériques variés.

Librarianship : Ce terme désigne la science des bibliothèques ou l'activité des bibliothécaires, qui sont voués à appliquer les théories et technologies aux processus de création, sélection, organisation, préservation, diffusion et utilisation de collections d'informations de tous formats.

Long tail : L'expression *long tail*, « longue traîne » en français, désigne le fait que les produits qui n'ont qu'un faible volume de vente peuvent collectivement représenter une part de marché égale ou supérieure à celle des best-sellers, si les canaux de distribution peuvent créer la liaison permettant de les découvrir.

Mailing list : Une liste de diffusion permet d'envoyer un courrier électronique à un grand nombre de personnes, puisque le même courriel est envoyé d'un seul clic à tous les membres de la liste.

Multimedia enabled : Un site « multimedia enabled » est prévu pour être apte à intégrer des contenus multimédia, qu'il s'agisse d'images, de sons ou de vidéos.

OPAC (Online Public Access Catalog) : Base de données composée d'entrées bibliographiques décrivant les livres et autres items dont dispose une bibliothèque, accessible via des terminaux publics. La plupart des catalogues permettent des recherches par auteur, titre, sujet et mots-clefs, et les résultats peuvent être imprimés, téléchargés ou exportés sur un compte de messagerie.

Participatory feature : Les dispositifs participatifs sont le noyau du Web 2.0 qui a pour but de valoriser la participation active de l'utilisateur et ses relations avec les autres.

Podcast : Constitué d'un fichier audio encapsulé dans un fil XML[14] auquel peut s'abonner un internaute, le podcast est un nouveau canal de distribution de contenus numériques.

Social bookmarking : Le *bookmarking*[15] *social* donne aux internautes la possibilité de marquer des pages Web et de les rendre accessibles au public ou à un réseau particulier afin de permettre à des gens ayant les mêmes centres d'intérêt de les consulter à leur tour.

[14] Voir Syndication, RSS, XML et Atom
[15] De *bookmark*, soit « marque-page » en français.

Social networks : Très en vogue actuellement, les réseaux sociaux sont des lieux virtuels de rassemblement d'internautes en fonction d'éléments communs (centres d'intérêt, vie professionnelle, géolocalisation, etc.). Les sites de *social networking* proposent souvent des fonctionnalités similaires, comme la possibilité de connaître des membres par l'intermédiaire de contacts communs, de faire découvrir divers éléments à ses contacts, etc. Parmi les réseaux sociaux les plus populaires à l'heure actuelle, on trouve Facebook[16] et MySpace[17], ce dernier étant principalement centré sur la musique.

Syndication, RSS, XML et Atom : La syndication Web consiste en la mise à disposition de tout ou d'une partie du contenu d'un site à d'autres sites. Le plus souvent, les contenus sont distribués par le biais de fils d'information comme les fils RSS (Really Simple Syndication) ou Atom. Les sites abonnés à un fil peuvent enrichir leurs propres contenus tout en renvoyant les visiteurs vers le site émetteur du flux. Les particuliers peuvent également s'abonner à des fils via un client dédié à la lecture de flux XML (Extensible Markup Language)[18], comme par exemple Google Reader[19].
Une fois abonné, le souscripteur est automatiquement averti de la publication de nouveaux contenus.

Icône de flux d'information

Tag : Les tags, terme traduit littéralement par « étiquettes », sont les mots-clefs associés à divers contenus. En général, les tags peuvent être ajoutés par les utilisateurs[20]. Les nuages de tags (*tag clouds*) sont la transposition visuelle des folksonomies, ils affichent les tags qui ont été les plus utilisés dans un laps de temps donné. La taille des mots y est proportionnelle à la fréquence de leur utilisation.

Exemple d'un nuage de tags

Vitual communities : Les communautés virtuelles sont des groupes de personnes formés sur base de différents critères selon la communauté en question et

[16] http://www.facebook.com
[17] http://www.myspace.com
[18] Fichier dans lequel les données sont structurées de manière spécifique.
[19] http://www.google.com/reader/
[20] Voir Folksonomy

qui se retrouvent et interagissent dans des lieux virtuels (sites Web, chats[21], forums, e-mails, etc.).

Web 2.0 : Évolution du Web caractérisée par une série d'évolutions technologiques impliquant un renouveau du rapport à l'Internet et dont les nouveaux paradigmes sont l'interactivité, la participation et la co-construction en transformant le lecteur passif en contributeur actif.

Wikis : Le wiki est un dispositif permettant aux internautes de rédiger et de modifier librement des articles sur un site Web. Cet outil de gestion de contenus permet donc de travailler de façon collaborative sur le modèle de l'encyclopédie participative Wikipédia[22].

[21] Voir Instant messaging
[22] http://fr.wikipedia.org/wiki/Accueil

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TABLE DES MATIÈRES

ANNEXE

The Academic Library Meets Web 2.0: Applications and Implications

by Chen Xu, Fenfei Ouyang and Heting Chu

Available online 18 June 2009

Visits to 81 academic library websites in the New York State reveal that 42% of them adopted one or more Web 2.0 tools such as blogs while implementation of those tools in individual libraries varies greatly. We also propose a conceptual model of Academic Library 2.0 in this report.

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Introduction

The term of "Library 2.0" was first coined by Michael Casey in September 2005.[1] Although the term initially provoked a considerable number of doubts, practitioners and researchers alike in libraries soon began actively exploring how Web 2.0 applications could be introduced to libraries for service enhancement and for encouraging participatory librarianship.[2] Though a specific consensus is still developing, examples of Web 2.0 applications in libraries include blogging, instant messaging (IM), information sharing (e.g., Flickr, YouTube), RSS (Really Simple Syndication or other variants), social bookmarking (along with tagging and folksonomies), social networks (e.g., Facebook, MySpace), virtual communities (e.g., Second Life), and wikis.

As "the Library 2.0 label reflects revolution more than evolution",[3] efforts are being made to support this revolution. Casey and Savastinuk defined Library 2.0 broadly from the perspective of public constitutions, suggesting "long tail" and "user-centered" as its main characteristics.[4] Miller subsequently described more features of Library 2.0 in a number of writings even though his affiliation, Tails Company, does not belong to the library category.[3,5] Needleman also illustrated what Library 2.0 is when drawing parallels between Web 2.0 and Library 2.0.[6] According to Maness, Library 2.0 consists of four essential elements and differs from Library 1.0 in several aspects.[7] These elements feature user-centered, multimedia, socially rich, and communally innovative.

Library 2.0 encompasses all kinds of libraries, including academic libraries. Thanks to their strong tradition in the IT forefront as well as their focus on education and research, academic libraries are quickly becoming the major players in adopting and incorporating Web 2.0 applications into their services compared with other types of libraries. In 2006 Michael Habib suggested the concept of Academic Library 2.0, describing how Web 2.0 tools could be applied in academic libraries for various purposes.[8] For example, data could be collected on resources consulted and students' comments on them via OPACs with Web 2.0 attributes as courses are repeated. Such data could be used to learn what resources work for certain assignments and subse-

quently offer suggestions like: "Other students studying this topic have looked at these resources or found this item useful when researching this assignment."

But to what extent does Academic Library 2.0 turn into a reality? Taking an empirical approach, we surveyed 81 academic libraries in the New York State by visiting their websites about their adoption and implementation of Web 2.0 tools in order to address the above question.[9] Based on our survey results and related publications, we then propose a conceptual model of Academic Library 2.0 which consists of Librarian 2.0, User 2.0 and Information 2.0. Additional characteristics of the Academic Library 2.0 model are also presented and discussed in detail in this report.

Literature Review

Writings on Web 2.0 and libraries have been mushrooming in recent years although most of them focus on what constitutes Web 2.0 and how they can be used in libraries.[10–14] Those publications normally discuss Library 2.0 conceptually and also without references to any specific library types or services. There are, however, several exceptions where attention has been given to the implementation of particular Web 2.0 tools for certain library operations.

Tagging and folksonomy seem to be two of the Web 2.0 applications that were closely examined in the literature from the perspective of library services. For example, Arch[15] depicted how to bring tagging into academic libraries to form a folksonomy while Spiteri[16] analyzed tags extracted from three sites in terms of their forms, types and other related facets in tagging. Coyle, on the other hand, elaborated on how Web 2.0 tools such as blogs, social bookmarking and Wikipedia postings can be adopted for building Catalog 2.0.[17]

In addition, academic libraries are the target libraries in several studies. Habib, as briefly mentioned earlier, wrote his master's thesis on the subject and made pioneering contribution to research on Academic Library 2.0.[8] Based on what has been published on Library 2.0 as well as what academic libraries have been doing, Habib proposed a conceptual model of Academic Library 2.0. Although Habib's Academic Library 2.0 model goes beyond the boundary of a library by including the social dimension of students' campus life, it does not cover research activities academic libraries strive to support.

Besides Habib's pioneering work on Academic Library 2.0, there are two other studies of pertinence and both focused on specific Web 2.0 applications in academic libraries. One study analyzed the websites of 111 ARL (Association of Research Libraries) members, recommending that future academic library website design should engage users in the process via relevant Web 2.0 tools.[18] The other study described how MediaWiki, a wiki software program, was integrated with electronic resource access in one academic library for online training as well as course-based information literacy instruction.[19]

While the literature reviewed above includes groundbreaking research on the topic, further investigations are apparently needed to, for example, assess the state-of-the-art of the Academic Library 2.0 movement. It is with this intention that we conducted a survey of 81 academic libraries in the New York State by visiting their websites on their adoption and implementation of Web 2.0 tools. According to our survey results along with the consultation of related publications, we also propose a conceptual model of Academic Library 2.0 which comprises Librarian 2.0, User 2.0 and Information 2.0.

Methodology

The current study derives from a poster presentation Xu did earlier.[20] When collecting data for that poster research, we initially visited the websites of academic libraries on Long Island, New York via a list of higher education institutions in the region (http://www.licentral.com/mainhtm/LI%20Colleges.htm). Specifically, we visited each by examining its homepage to locate any links or other similar indications (e.g., an icon for RSS) of Web 2.0 applications which included blogs, IM, podcasts, RSS, social networks, tagging, and wikis in our survey. If a homepage showed no such information, we would then browse the website via links to its next level (e.g., clicking on the Library Services link at the website of Long Island University's C.W. Post campus library). If a library provides a search mechanism at its website, we would use specific Web 2.0 application names like blog to locate what we were looking for. A target library is determined having no Web 2.0 tools implemented when neither our browsing nor searching efforts yielded any results.

Preliminary results of the survey showed that those Long Island academic libraries only adopted, if at all, Web 2.0 tools on a very limited scale. The survey was then expanded to all 53 libraries listed under the Academic category at http://www.librarysites.info/states/ny.htm. In the case of SUNY (State University of New York) and CUNY (City University of New York) where multiple campuses exist, we also visited the websites of those libraries located on different campuses for data collection purpose. In some cases, both the university library (e.g., Yeshiva University) and a branch library (Albert Einstein College of Medicine) were included because the latter is in essence operated independently. As a result, a total of 81 academic libraries were surveyed in this study, including those Long Island based academic libraries we visited earlier when preparing for the poster presentation. Appendix A provides a list of those 81 academic institutions along with their library homepage URLs.

"results of the survey showed that those Long Island academic libraries only adopted, if at all, Web 2.0 tools on a very limited scale."

As described earlier, each of the 81 academic libraries' websites was examined to find out 1) whether particular Web 2.0 tools were adopted and 2) how the

adopted Web 2.0 tools were applied in library operations and services. What had been gathered during this process was later analyzed both quantitatively and qualitatively. As stated in the beginning of this report, we present in the space below not only findings of this survey but also a conceptual model of Academic Library 2.0 constructed with the survey data as well as related publications.

The reason why we chose only academic libraries in the New York State is mainly two-fold. First, we are affiliated with an academic institution on Long Island, New York. Thus our familiarity with the state would help us better understand and interpret our research results. Second, New York State is unquestionably the hub of many well-known and active academic libraries in addition to other libraries of various kinds. Those academic libraries in the New York State together can reasonably reflect what status the Academic Library 2.0 movement acquires in the field. However, we are fully aware that the 81 academic libraries we investigated are by no means statistically representative of all the academic libraries in existence.

Results and Discussion

As described earlier, we explored the websites of the 81 academic libraries in the New York State to find out to what extent Web 2.0 tools were adopted. Fig. 1 shows that 34 (42%) institutions out of the total introduced Web 2.0 tools to their libraries while 47 (58%) did not. In other words, only less than half of the 81 academic libraries surveyed used one or more Web 2.0 applications (e.g., blogs and wikis) for various purposes. Many libraries included in this study, however, still rely on traditional means such as email, telephone phone or regular webpages for providing services to their users.

Adoption of Specific Web 2.0 Tools

A group of Web 2.0 applications have been developed since 2005 when the term was coined. They include blogs, IM, podcasts, RSS, social networks (SNS), tagging or social bookmarking, and wikis. Fig. 2 summarizes the extent of specific Web 2.0 tools being implemented by the 34 academic libraries in New York State. As one library may adopt more than one Web 2.0 tool, the total number of implementations exceeds the number of the libraries involved.

As seen in Fig. 2, IM seems to have been adopted most frequently by the academic libraries selected for this

Figure 1
Academic Libraries and Web 2.0 Applications ($N = 81$).

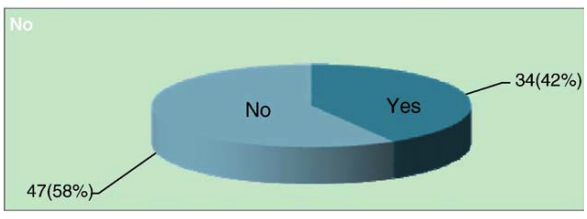
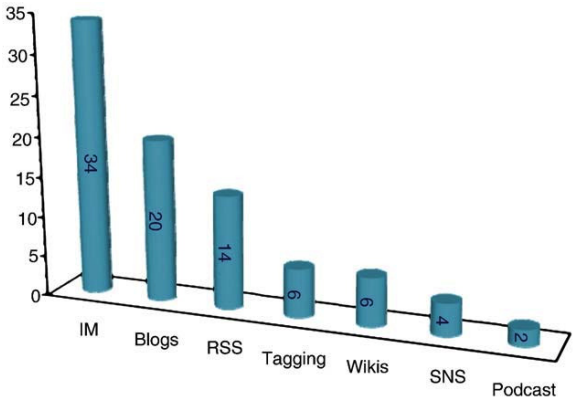


Figure 2
Adoption of Specific Web 2.0 Applications.



study. The reason behind its popularity may be because it can easily be implemented in reference services to replace traditional methods like email or telephone. With IM, librarians and users would not only communicate with each other but could also keep a script of their exchanges if they so wish. In addition, IM offers synchronous communication whereas email does not.

Blogs' popularity as a Web 2.0 application in academic libraries is only second to IM, according to our survey results. Some institutions (e.g., Alfred University) build their own blogs while some combine blogs with other Web 2.0 applications. Among such integrations, RSS appears to be most commonly used with blogs. For example, users of Canisius College Library can use RSS to sort or filter news at the blog site. Polytech University Library, on the other hand, offers the tagging functionality at its news blog, enabling its users to organize news information within blogs.

RSS is ranked third in terms of Web 2.0 tool adoption frequency in this research. Due to its unique functionality, namely, using Web feeds to frequently provide and deliver updated contents of chosen topics to given destinations, RSS is often used together with a blog (e.g., Canisius College Library) or wiki (e.g., SUNY at Albany).

The remaining four Web 2.0 tools displayed in Fig. 2 are tagging, wikis, social networks and podcasts. Although they are at present implemented less widely in the academic libraries we surveyed in this study, they are by no means less important or functional in library services and operations. Rather, they each have their particular functionalities and potentials in academic libraries as we would elaborate and discuss further in the following section titled “Uses of Specific Web 2.0 Tools”.

As mentioned earlier, Web 2.0 tools are regularly used in aggregation. Besides what was already described (e.g., blogs with RSS or tagging), other examples of aggregation include social networks with IM, wikis with tagging, and tagging with podcasts. This integrated application of Web 2.0 tools apparently represents some characteristics salient to the

Web 2.0 movement: contributions by the user and for the user.

Uses of Specific Web 2.0 Tools

Web 2.0 applications, like other information technologies, facilitate library operations and services in many ways. We describe and discuss below how the seven specific Web 2.0 tools were utilized after being adopted by the academic libraries we included in our study.

IM, as the most frequently adopted Web 2.0 tool in our sample of academic libraries, is typically used as an alternate communication channel in reference services between librarians and users or even among users themselves. The libraries either chose commercial programs (e.g., QuestionPoint at Albert Einstein College of Medicine) or free platforms (e.g., Google Talk at Columbia University) for incorporating IM in reference services. Users can ask librarians questions in real time regardless of where they are. Users may also attempt to answer questions other people posed if they are able to. In the latter case, the participatory feature of Web 2.0 applications is clearly demonstrated. When a library chooses to use a free IM platform such as Google Talk, its users would normally have easier access to the IM imbedded reference service as those free IM platforms are virtually available to everyone on the Internet.

According to our survey results, blogs are mainly used as a news bulletin in the academic libraries we examined. Librarians often make announcements or place news items using the blogs. A typical practice is that librarians or library administrators post messages to the blog while users can comment on the blog postings. Increasingly, blogs are implemented in conjunction with other Web 2.0 applications such as RSS and tagging. This kind of integrated applications of Web 2.0 tools, as previously discussed, encourages more active user participation than an environment in which a blog is set up as a stand-alone Web 2.0 application at the library website.

"According to our survey results, blogs are mainly used as a news bulletin in the academic libraries we examined."

RSS, as shown in Fig. 2, is adopted by 14 academic libraries we surveyed. Some of the libraries (e.g., The Rockefeller University Library) implemented RSS on a blog platform while others (e.g., Rochester Institute of Technology Library) used it as one major tool for aggregating news or selected types of information at their websites. RSS, as one Web 2.0 tool, is apparently used for providing up-to-date news or current information to library users. The library community can, via RSS, stay informed of current events, happenings, new products and other news information that are of interest to them.

Tagging appears to be a Web 2.0 application with great potentials in academic libraries although only a small number of the libraries we surveyed have adopted it. Tagging facilities allow users to "index" what they are viewing with words or phrases of their choices which are known as tags or bookmarks. In a sense, tagging can be considered as keyword indexing by the end user.[21] There are typically two implementations of tagging in our sample of academic libraries. One treats tagging as an added function on the library blog site where users tag blog postings (e.g., Polytech University Library). The other implementation lets users search existing tags already created for locating relevant information that is otherwise not searchable (e.g., St. Bonaventure University Library).

One potential application of tagging we did not see in our survey data is inviting users to tag in library OPACs although such practices were reported in certain publications like the one by Stephens.[22] In addition, tagging products (i.e., tags) are often put together automatically to form the so-called tag clouds or folksonomies, which can be further used for indexing and retrieval purposes in the library environment. Strictly speaking, tag clouds are the visual display of folksonomies and generated merely based on tag frequencies. That is, tags or folksonomy entries with higher frequencies are visualized larger than those with lower frequencies in a tag cloud. It should be noted that folksonomies are not the same as traditional controlled vocabularies in terms of rigor and quality. However, they provide unique access points to the resources from which they are derived and, more importantly, from the perspective of users instead of academic librarians. Although the academic libraries we surveyed did not incorporate tagging into their cataloging and other similar operations at the time of our data collection, we firmly believe that such application of tagging would soon, if not already, be realized in those academic libraries we sampled.

With the same adoption frequency as tagging in our study, Wikis provide the very mechanism that supports participatory librarianship as it enables users to make original and genuine contributions to subject contents a library aims to cover. Both Stony Brook University Library and SUNY at Albany Library implemented wikis to maximize their functions and benefit their users. In addition, Stony Brook University integrates wikis with the blog at its student learning platform. The other libraries that also adopted the wiki tool, however, basically place the application at their websites with little facilitation.

Social networks such as Facebook and Myspace, originally developed for the general public, were adopted by four academic libraries in our data pool. Nevertheless, this Web 2.0 application can also be used to create virtual communities within the library environment. Both Facebook and Myspace, the two most popular programs of this category, have been chosen to build social networks of various types in the library universe. For instance, Rochester Institute of Technology Library has a library community using Facebook. At the time of our data collection, members of such social networks mainly consisted of librarians with few users as participants. In comparison with the online communities based on mailing lists, social networks offer a

wide range of tools for members to perform community related activities synchronously (e.g., chat) as well as asynchronously (e.g., exchanging photos and videos).

Podcasting is the least adopted Web 2.0 tool by the academic libraries in our sample because only two of them implemented podcasts at their websites. Specifically, Dowling College Library utilizes podcasts as a traditional radio broadcast for users to listen to library related tutorials. Hunter College of CUNY, on the other hand, offers audio files via podcasts for users to download and then play offline. As seen, the Web 2.0 feature of podcasts was not fully exploited at both libraries since neither supports any mechanism for the users to upload anything to the library website for sharing and other purposes. Compared with the six Web 2.0 tools we already discussed up to this point, podcasting appears to have limited functionality in academic libraries.

"Podcasting is the least adopted Web 2.0 tool by the academic libraries in our sample because only two of them implemented podcasts at their websites."

In summary, the uses of specific Web 2.0 tools in the academic libraries we surveyed in general illustrate the roles those tools can play in library operations and services. Our findings can be approximately summarized in Table 1.

While seven different Web 2.0 tools (i.e., IM, blogs, RSS, tagging, wikis, social networks, and podcasts) were implemented by the 34 academic libraries, there seems to be a great deal of variation among individual institutions with regard to actual utilization. Moreover, librarians appeared more keen and active than the end users in employing or incorporating Web 2.0 tools in academic libraries. The lag in user participation in the Library 2.0 movement perhaps will be minimized or eliminated when users become more Web 2.0 savvy and the Library 2.0 platform matures.

Towards a Conceptual Model of Academic Library 2.0

In the preceding two sections, we presented the results of our survey of the 81 academic libraries in the New York State on the adoption and uses of specific Web 2.0 tools. We plan to develop in this section a conceptual model of Academic Library 2.0 based on our findings and published literature.

As shown in Fig. 3, Library 2.0 overall exhibits four distinct features: user originated, socially rich, multimedia enabled, and communally innovative.[7] In a full Library 2.0 environment, library services could be originated from users when they, for example, answer reference questions with self-created wiki entries. Thanks to such applications as blogs and social networks, what is provided to users would no longer come from librarians only. Rather, users can also go to blogs, social networks, and the like for meeting their information needs. One outstanding feature of the Web is its ability in handling multimedia, which is seamlessly embedded in Web 2.0 tools. Multimedia information such as video and images along with texts could be easily transferred, exchanged or displayed at library websites with Web 2.0 applications. The fourth feature of Library 2.0, communally innovative, in fact has two implications. One is that users would also be contributors in libraries instead of merely staying at the receiving end. The other layer of meaning implied by this feature is that librarians and users together would bring about innovative outcomes in the library environment. Tagging can

Table 1
From Library 1.0 to Library 2.0: some applications

Library 1.0	Library 2.0
References with traditional means	References with Blogs, IM, RSS, Tagging, Wikis
Cataloging	Tagging in OPACs
Online communities via mailing lists	Online Communities via Social Networks
Text-based tutorials	Podcast-based Tutorials

Figure 3
Library 2.0: Four Features.

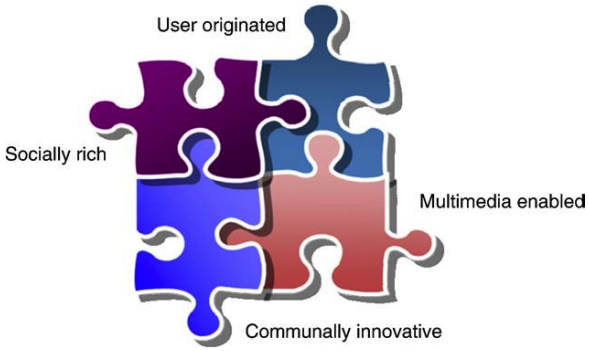


Figure 4
Web 2.0 and Libraries: Five Essentials.

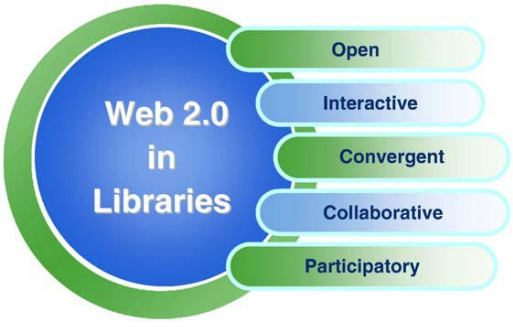
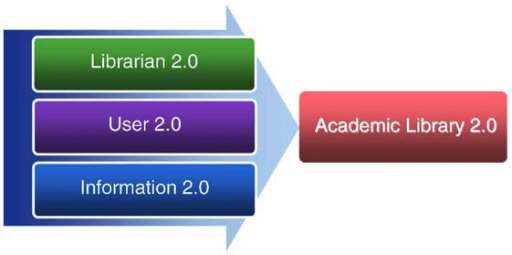


Figure 5
Academic Library 2.0: Three Components.



serve as an excellent example when it is incorporated in library OPACs.

Madden and Fox, without making any particular reference to libraries, delineated Web 2.0 as "utilizing collective intelligence, providing network-enabled interactive services, giving users control over their own data".[23] We translate those characteristics of Web 2.0 from the library perspective, which become the five essentials of Library 2.0 (See Fig. 4).

To put in narratives, the five essentials we explain below appear quite visible when Web 2.0 tools are applied to libraries in forming Library 2.0. 1) Library 2.0 must be **open** to allow and enable further development of its operations and services. 2) Library 2.0 must be **interactive** so that users have opportunities to contribute and react in libraries with the help of Web 2.0 applications. 3) Library 2.0 must be **convergent** to accommodate various Web 2.0 tools to accomplish its missions. 4) Library 2.0 must be **collaborative** in order to make librarians and users function as collaborators rather than as disseminators and receivers at the two ends of the library communication spectrum. 5) Library 2.0 must be **participatory** as participation takes central stage in the Web 2.0 movement, whose absence would invalidate Library 2.0.

The four features and five essentials of Library 2.0 are portrayed from the viewpoint of all types of libraries. As academic libraries have their own distinctive attributes, the emerging Academic Library 2.0 should attain corresponding specifics when the academic library meets Web 2.0. Fig. 5 outlines the three components of Academic Library 2.0: Librarian 2.0, User 2.0 and Information 2.0.

Librarians working in Academic Library 2.0 should have qualifications as well as play roles different from the time before Web 2.0 came into existence. Table 2 details the qualifications and roles required of Librarian 2.0 in the academic environment. Apparently, Librarian 2.0 faces more challenges than ever before to offer quality services to library users while keeping pace with the rapid development of Web 2.0 technologies and encouraging user participation in libraries. Looking back, academic librarians have always been among the early adopters of information technology. This time shall be no exception.

Table 2
Librarian 2.0 in Academic Library 2.0.

Qualifications	Roles	
● Creative	● Contributor	● Facilitator
● User-oriented	● Organizer	● Coordinator
● Active participation		

Table 3
User 2.0 in Academic Library 2.0

Students	Faculty Members
● Quick adoption of Web 2.0 tools	● Wide range in adopting Web 2.0 tools
● Active participation in Academic Library 2.0	● Teaching and research with Web 2.0 applications
● Extension of Academic Library 2.0 to other dimensions of campus life	

The user groups Librarian 2.0 serves in Academic Library 2.0 comprise both the Net Generation[24] (i.e., students) and seasoned experts in their own respective fields (i.e., faculty members). This specific make-up not only motivates but also challenges academic librarians. The multiple hats librarians wear (e.g., contributor and coordinator) in Academic Library 2.0 likewise indicate the responsibilities they are expected to shoulder. They on one hand select, collect, organize, and disseminate knowledge and, on the other, serve as the link between the library and user on the Web 2.0 platform by providing services as well as considering user inputs after collecting them.

As indicated earlier, academic library users primarily constitute students and faculty members. Each group of the users manifests their own information behaviors and needs (See Table 3). The student cohort, belonging to the Net Generation, is the so-called digital citizens, quick in using various kinds of technologies (including Web 2.0 tools). The faculty group, in contrast, could have members of digital immigrants, typical Library 1.0 users or anywhere in between. In addition, faculty members are supposed to perform dual tasks on campus (i.e., education and research) besides the ser-

Table 4
From Information 1.0 to Information 2.0

Information 1.0	Information 2.0
Linear	Nonlinear
Organized and provided by librarians	Organized and contributed by both librarians and users
One-way information flow: from librarians to users	N-way information flow among librarians and users
Huge time lag	Negligible time lag

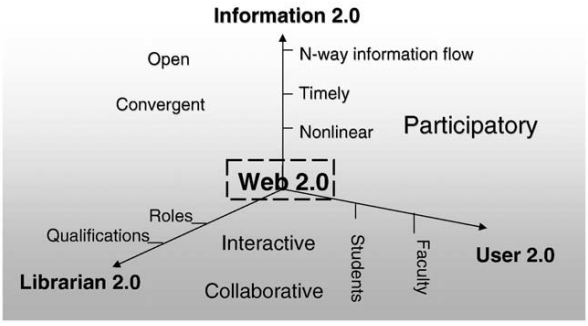
vice requirement. Either task needs the support of the emerging Academic Library 2.0 environment as Web 2.0 applications are penetrating all facets of the campus.

The third component in Academic Library 2.0 is Information 2.0 which displays different characteristics when compared with Information 1.0 (See Table 4). The dissimilarities exist in four aspects. First is the way information is presented. Before the implementation of hyper-structure, an inseparable part of the Web, information was in general presented linearly. Now the nonlinear presentation of information via hyperlinks becomes the norm. Second, organizing and providing information were exclusively the responsibilities of librarians in the past while the same duty can be performed collaboratively by both librarians and users in Academic Library 2.0 through Web 2.0 tools such as tagging and blogging. Third, the direction of information flow was traditionally one-way in Information 1.0 and is being changed into N-way in Information 2.0 as the communication takes place among librarians and users in all possible directions. As indicated earlier, users no longer are the passive receivers of information. Rather, they may well function as active contributors of information using appropriate Web 2.0 tools. Likewise, information of various kinds can be accessed more timely in Academic Library 2.0 than in the past thanks to Web 2.0 applications such as RSS.

Fig. 6 visualizes a conceptual model of Academic Library 2.0 which maps Figs. 4–5 and Tables 2–4 we presented earlier on a three dimensional space. This model signifies that Academic Library 2.0 evolves from Library 2.0 and meanwhile features what is unique to academic libraries.

This conceptual model of Academic Library 2.0, as demonstrated in Fig. 6, is intended to capture major rudiments and constituents when Web 2.0 tools are introduced into academic libraries. Even though the model was visualized three dimensionally, the actual relationships among what is involved in Academic Library 2.0 far exceed the space we can use physically. On the other hand, the Academic Library 2.0 model we proposed is only an initial step towards our efforts to fully explore the applications and implications when Web 2.0 and the academic library interact.

Figure 6
The Academic Library 2.0 Model.



Conclusions

Academic libraries in the New York State have begun embracing the Web 2.0 movement although less than half of them we surveyed adopted any Web 2.0 tools. Those libraries collectively implemented, albeit on varying scales, IM, blogs, RSS, tagging, wikis, social networks, and podcasts to enhance or improve their library operations and services. Among the seven Web 2.0 tools adopted by the academic libraries in our sample, IM takes the lead in terms of adoption frequency, followed by blogs and RSS.

"Academic libraries in the New York State... collectively implemented, albeit on varying scales, IM, blogs, RSS, tagging, wikis, social networks, and podcasts to enhance or improve their library operations and services"

Public services in the library (e.g., references) appear ready to apply Web 2.0 tools (e.g., IM, blogs and RSS) as "user" is the keyword in this domain. In comparison, technical services of the academic library (e.g., cataloging) are yet to explore the value of Web 2.0 tools such as tagging. Furthermore, academic librarians seem more active than their users in Academic Library 2.0 according to our survey results. Certain Web 2.0 tools (e.g., blogs) were exclusively used by librarians in the libraries we surveyed. Exploring possible reasons behind this phenomenon is however beyond the scope of this study.

Academic Library 2.0 is emerging with the efforts from both librarians and users in addition to the advances of Web 2.0 technologies. The conceptual model of Academic Library 2.0 we proposed should certainly be further revised and expanded as more and more academic libraries implement Web 2.0 applications. Although it seems not viable for us to fully anticipate the future of academic libraries in the presence of the rapidly evolving Web 2.0 technologies, we confidently believe that academic libraries would only serve their users better when applying the user-participated Web 2.0 tools in their operations and services.

Appendix A. Supplementary Data

Supplementary data associated with this article can be found, in the online version, at doi:10.1016/j.acalib.2009.04.003.

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