Students' Inquiry Learning in the Web 2.0 Age

Jacky W.C. Pow, Sandy C. Li and Alex C.W. Fung
Department of Education Studies, Hong Kong Baptist University, Hong Kong, China

Abstract: The information proliferation in the Web 2.0 age has led to several emerging issues, namely, the authenticity of information, disorientation, and information searching and citation issues in the academic field. Students often find themselves in a difficult situation when they are doing Web-based inquiry learning when the usefulness and truthfulness of the Web information are doubtful. Based on the study of pre-reading activity and Web searching behaviour of Lawless, Schrader, and Mayall (2007), and the Web information evaluation work of Eagleton and Dobler (2007), this paper proposes a guiding framework to help students determine the usefulness and truthfulness of information in their inquiry process. This framework also provides guidance on how to store and cite Web 2.0 information. However, the effectiveness of the guiding framework has not been empirically tested and further study regarding its applicability is called upon.

Keywords: Web 2.0, Inquiry Learning, guidance framework

1.   BACKGROUND

Over the past couple of years, the development of Asynchronous Javascript and XML (AJAX) has provided us not just a browsing tool but a Web-based platform where we can *participate* and *publish*. The concept of 'the Web as a platform' is one of the key principles of Web 2.0 (O'Reilly, 2005). Because of this the amount of information on the Web has expanded in an exponential scale. This augmentation of Web information may mean more resources for our students, on the one hand, but also an impediment in their learning on the other. In Web-based inquiry learning, students need to manage their inquiry processes such as searching, categorizing, prioritizing, and rearranging of information; and they should also learn to differentiate facts from opinions. Besides having a skeptical mind to examine the information they have collected on the Web in the inquiry process, they need to have a systematic way to store, retrieve and cite the collected information.

These tasks are becoming more challenging to students as a result of the blooming Web 2.0 and this paper is an attempt to put forward a guiding framework for them to address these issues.

2.   WEB 2.0 AND THE INQUIRY PROCESS

While there is seemingly no agreed definition of Web 2.0, some preliminary principles were outlined in the first Web 2.0 Conference in 2004 (O'Reilly, 2005). Among the principles, 'Web as a platform' and 'Harnessing Collective Intelligence' were the most eye-catching ones. In simple terms, Web 2.0 is the second generation of the World Wide Web where colla-boration of participants' efforts in building up social, business, or other communities has been made possible; in contrast to the traditional surfing on WWW sites merely for browsing information. Thus Weblog and Wiki have become common terms that are illustrative of Web platforms where users can publish their views or share their experience. In Web 2.0, users can now have more freedom to "add, remove, or otherwise edit and change all content very quickly and easily, sometimes without the need for registration" (Wikipedia, as cited in Edmonds, 2006). This new and efficient mode of knowledge-building for anybody with any background to contribute has in some ways played down the role of *expert* knowledge. However, it is also exactly this 'collective intelligence' (The New Media Consortium and the EDUCAUSE Learning Initiative, 2008) that the proponents of Web 2.0 treasure.

In the early days of the information age, educational institutions simply had to provide facilities for students to access the needed informational resources in support of their inquiry learning initiatives. Access to information on the internet was not as easy and widespread as today, and students needed only training in information searching skills. Apparently students of today need something more. On top of facilities and surfing skills in cyberspace, their habits of mind is also an important concern. Students need to have not only an inquiry mind but also a critical mind. There is so much deceptive information on the Web nowadays that makes us hard to judge what is authentic. Hence, the problems associated with accessibility to information have now evolved into problems related to identifying trustworthy, relevant and quality information. Convenience in accessing information is no longer a priority in the inquiry process. The success of ICT now depends on whether one can get useful and truthful Web information (Eagleton and Dobler, 2007) rather than on the ability to just get access to information. As a result, we need to develop students' critical thinking and evaluation skills in order to assist them to evaluate the usefulness and truthfulness of the information collected on the Web. As pointed out by Richardson (2006, p.77), "given the fact that the amount of information going online shows no sign of slowing, if they (the students) are unable to consistently collect potentially relevant information for their lives

and careers and quickly discern what of that information is most useful, they will be at a disadvantage. And, as with the rest of these changes, it's our job to model and teach these skills."

3.   THE EMERGING ISSUES

3.1   The Authenticity of Information

The emergence of Web 2.0 technology seems to have led us from an information age to a *misinformation* age. The flooding of blogs, social networking and social video-streaming platforms (e.g., YouTube and Yahoo!Video) may well only mean more opinions but not facts and knowledge. Through the Internet, spreading a piece of rumour is as simple as a mouse click. It would be really difficult not only for our students but even for us to tell what is *real* on the Web. In this respect, we have to find a way to help our students learn to distinguish the *good* from the *poor* information. Thus Wikipedia, for instance, has recognized the potential problems of 'everyone can contribute' in providing information, and has already strengthened its monitoring or quality assurance mechanism so as to regain the confidence of its readers to make reference to it as a reliable source (Wikipedia:Verifiability, accessed 2007). This is not something trivial as more and more people are using Wikipedia as a reference source.

Authenticity and authoritativeness of information thus has become an important issue in today's world since information is so easily accessible and distributed over the internet. In this Web 2.0 age, virtually everyone can *participate* and *publish* online. Publishing on the Web is so popular nowadays because the production cost is much lower than its print counterpart as a result of the shortened production cycle of a publication. People can publish and enter the e-publishing industry much more easily than in the old days. The question is – who would gatekeep the quality so that the information or knowledge on the Web is accurate and trustworthy?

For long we have trusted academic publishing (e.g. journal and books) because of the peer review or editorial refereeing. Publishers especially the established ones would be very conscientious in what they are publishing. The editors of the publishers are the *gatekeepers* and this quality checking mechanism has been functioning well. Many of us may agree that information on the Web is profuse, updated, easily accessible, useful, etc. This impression might have been implanted in the minds of our students and it is now time to do something in remedy. We tend to assume that most of the print text are credible and take for granted that we are not "the first stop in the evaluation chain, which initially begins with authors, editors, and publishers, all of whom have provided additional layers of evaluation before the printed text reaches his hands." (Eagleton and Dobler, 2007, p.163.) However, we have to educate our students that most of websites do not

automatically have this built-in evaluation mechanism. This has been contrasting to the established evaluation mechanism mentioned above. There is thus a need to have some good guidelines for our students in evaluating Web information.

3.2   Disorientation issue

Another problem that many of us might not handle well in using the Web is *when to pause*. The vast information on the Web makes one easily disoriented in an ocean of knowledge. Searching on the Web is much more complicated than reading a book, with different websites organizing different contents of different levels in various ways. The Web is not a well organized information depository and students would have difficulties in encountering this issue of breadth versus depth when surfing on it. This is especially so for young students who may not have much Web or hypertext experience. The spaghetti-like hyperlinks embedded in a hypertext environment often exacerbate this disorientation problem, and students can easily get lost in the cyberspace. As Kehoe puts it, "access to vast amounts of information is not the whole answer. The power to discover the right info quickly and easily, to separate nice to know from need to know info is essential if superhighway users do not drown in electronic junk info….An info flood does not necessarily mean that people become informed." (cited in Eagleton and Dobler, 2007, p.163.) Too often, unfortunately, the responsibility of getting the appropriate level of information is solely put on the students.

3.3   Information searching and citation issues

Another emerging issue with Web 2.0 is one's inability to make reference to the exact location of dynamic webpages written with AJAX. Web content written with AJAX will update automatically without the need to reload the whole webpage. This means that the links which we once cited would likely be constantly updated. This dynamic nature of AJAX webpages creates problems for the existing search engines. The search results of most existing search engines provide links that contained the keywords. With AJAX webpages, although links are provided, they may not necessarily bring us back to the previously identified webpages by the search engines since the page content might have been changed a number of times already. This has made proper citation of Web2.0 information problematic.

Web 2.0 may be doing something good to the business or communication industry such as word-of-mouth advertising and staying in touch with the customers through *social networking* (Skul, 2008). In education, the benefits are not so eminent yet. Web 2.0 does provide more opportunities for us to communicate and collaborate but it may not have direct benefits to teaching and learning. On the contrary, Web 2.0 seems to *dilute* the truthfulness of information on the Web as the authoritativeness of a piece of information on

the Web cannot be easily established. This is because there is usually no quality assurance or peer review of what is posted on the websites (Sandars, 2006). This is especially the case when anonymous users (some wiki websites do not require the users to register or identified themselves) can edit the content of wiki quickly and easily (Edmonds, 2006).

So getting back to inquiry learning, Internet resources are said to be useful when students can search for suitable information to complete their project and teachers can find useful information to support their teaching. But how could we effectively locate useful and truthful information in Web 2.0 environment? How could the information on AJAX webpages be cited? How can we square this circle? These are the obstacles that needed to be surmounted.
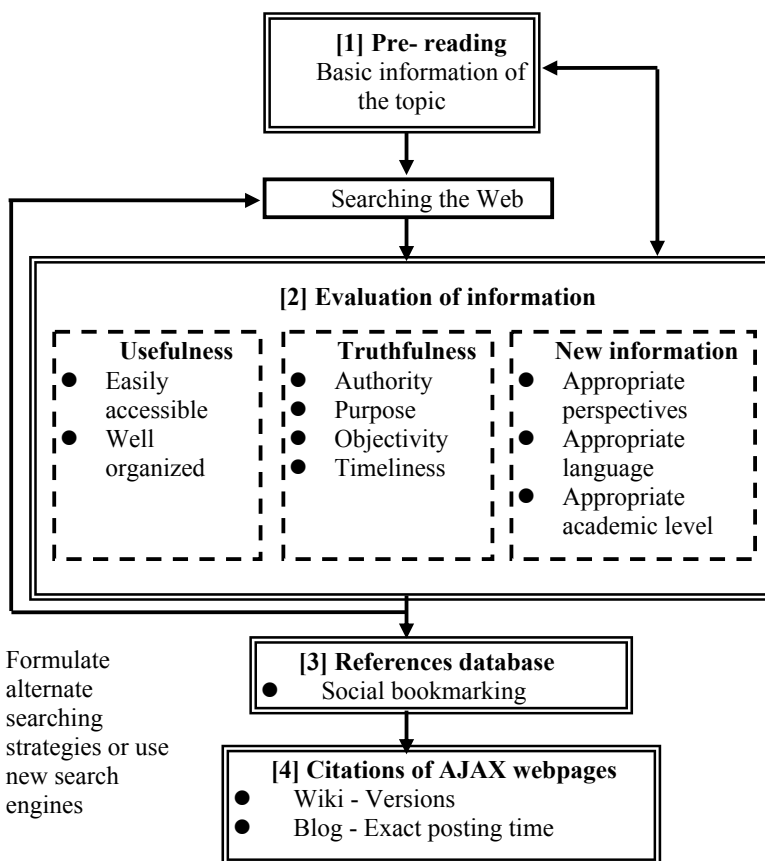

Figure 1: The proposed guiding framework in managing inquiry process in Web 2.0 age

4.   A PROPOSED GUIDING FRAMEWORK

Our proposed guiding framework consists of four parts, with each part focusing on different stages in the inquiry learning processes. They are [1] pre-reading activity which focuses on information searching strategies and behaviours, [2] Evaluation of information which highlights the evaluation of usefulness and truthfulness of information, [3] References database which refers to organizing the information, and [4] Citations of AJAX Webpages which emphasizes the need to give additional information in citing Web 2.0 materials (see Figure 1 above).

4.1   Pre-reading activity

Lawless, Schrader, and Mayall (2007) point out that students with prior knowledge of the topic will have better WWW browsing outcomes (i.e., navigation behaviour and knowledge gain.) Initial research indicates that prereading activity designed to enrich students' prior knowledge in a topic would help in the search for new information strategically. Students will spend more time browsing, viewing more multimedia resources, and utilizing more in-text embedded links (Lawless, Schrader, and Mayall, 2007.)

In view of this, we try to incorporate this pre-reading activity into the guiding framework to help students develop their searching strategies. In this framework a prereading activity is suggested before performing Web searching. Students would be given a prereading text containing essential concepts and ideas of the topic concerned in the inquiry learning. Besides providing basic and reliable information to the students, it is believed that the prereading text would serve both as a starting point and guidelines for students to search for and evaluate the Web information more productively.

4.2   Evaluation of information

To help readers get the information they want, Eagleton and Dobler (2007) propose some ideas and clues to evaluate the usefulness and truthfulness of Web information.

4.2.1 Usefulness

Regarding the usefulness of some Web information, they suggest clues like the ease of accessing the information and whether the information could help them to answer the questions on hand. Usually graphics, diagrams, figures or multimedia within the website are helpful for users to understand the topic concerned. If the information is not systematically organized or the supporting materials are not helpful, then the usability of the information of that website would be low.

4.2.2 Truthfulness

Regarding the evaluation of trustfulness of Web information, they propose an array of clues to be used, viz. authority, purpose, objectivity, and timeliness. *Authority* refers to who wrote the information. Assess the credential of the author (personal, company or organization). If possible look for the qualifications of the website author and his/her email address. The *purpose* of the website also guides the type of information available and the way information is shown. The *objectivity* of web information requires a fair description of all sides involved without bias and opinion. Users should try their best to detect bias or opinions versus truth and facts. *Timeliness* refers to whether the Web information is current and up-to-date. Most credible websites contain a footer to show the dates of creation and last update. Users can then decide whether or not to use the information in these websites. With all these clues, users may have a better chance to get more reliable Web information.

4.2.3 New Information

The evaluation of new information will work with the prereading text. In this part, students would assess the Web information from three aspects: appropriate perspectives; appropriate language; and appropriate academic level. With the basic information provided by the prereading text (or a detailed mind-map), students may be able to search for information from the orientation set out in the text. Moreover, the language used in the prereading text may serve as guidance for students to search for information of similar level of language use. With the level of details provided in the prereading text, students may be able to compare the academic levels of the Web information and hence to facilitate the evaluation process.

4.2.4 References database

After the evaluation, there will be two possible outcomes. One is that the search did not contain the needed information and it is necessary to formulate alternate searching strategies or use a new search engines (Eagleton and Dobler (2007). Another possibility is that the needed information had been identified. In this case, the students would need a way to store and retrieve their information. In this respect, we consider social bookmarking (a Web 2.0 service) to be fitting for this purpose. Simply put, social bookmarking (e.g., del.icio.us) is a public and online service for Web users to "save links, annotate them with unique keywords or 'tags' to organize them, and then share them with the world." (Richardson, 2006, p.91) Through this find-tag-share process, students can then create a community of researchers that have the same interests or endeavours, gathering relevant information together with other Web users (Richardson, 2006). Most importantly, teachers can also participate in this social

bookmarking, helping the students to gather more quality websites for inquiry learning.

4.2.5 Citations of AJAX Webpages

As for the issue of citation of AJAX webpages, we do not have a simple and direct solution. Although more and more scholarly publishers begun assigning Digital Object Identifier (DOI) to journal articles and documents (APA Style, 2007), this can only solve part of the problem. As the content of blogs and wikis is prone to be updated, revised, moved and restructured without an overarching body to supervise all these resources, the chances to be assigned a persistent link (or DOI) are thin. Therefore even though a link was cited, it would still be unable to direct the readers to the source that used. Nevertheless, we need to edify our students to recognize the importance of proper referencing, in the least. Perhaps the addition of some extra information, such as the *version* of a Wiki and the *exact posting time* of a Blog, should be included in the citations; so that readers are provided with the paths as far as possible if they are interested to re-locate the information.

5.   IMPLICATIONS ON MANAGING STUDENTS' INQUIRY LEARNING

Managing a class of students to use technology-based inquiry learning is demanding because it would require the provision of extensive scaffolding and guidance to facilitate student learning by the teachers (Hmelo-Silver, 2006; Quintana, 2004). As Hmelo-Silver *et al.* have said, the teachers would need to assume "a key role in facilitating the learning process and may provide content knowledge on a just-in-time basis." (Hmelo-Silver, Duncan, and Chinn, 2007, p. 100.) This is a challenging and demanding role for teachers as inquiry learning is a process with multi-stages of Planning, Retrieving, Processing, Creating, Sharing and Evaluating (Alberta Learning, 2004). Generic information literacy skills are required on students' part in the various stages to identify possible information sources, to choose and record pertinent information, and to organize the information. In this regard, our proposed framework can provide guidance to students to construct meaningful linkages between various stages in the inquiry model. At the same time, teachers can use the framework as a road-map to help manage and monitor students' progress at the different stages in the inquiry learning process. With terminologies and a common language based on the framework, the provision of just-in-time input and feedback by teachers to students would be much facilitated.

Moreover, teachers would also have a clearer picture on the quality of the Web information collected by the students. As suggested in the framework, a references database could be developed on a social bookmarking platform

(e.g., Del.icio.us), so that both students and teachers can refer to a common central source of references for the issue(s) being inquired. While students can thus learn collaboratively by cross-checking the truthfulness and usefulness of the Web information collected by peers, teachers can assess the ability of their students in evaluating and organizing the Web information. This centralised repository is also useful for teachers to verify what the students have referenced in order to provide timely feedback; or to input subject knowledge as necessary to fill in any gaps identified.

6.   CONCLUDING REMARKS

While inquiry learning is gaining its popularity as a learning approach, we have to let our students know the important question – where does this piece of information come from (Cafolla, 2006)? We all agreed that referencing system is essential in academic community. Therefore, it is natural for us to nurture our students to have a skeptical view towards Web information. This is important. The Web may bring us convenience in accessing information but at the same time may also bring us troubles in digging out useful information when there are too much. A little more effort to verify the information is better than using a piece of misinformation or acquiring some wrong concepts. This essential academic practice should be fostered in our basic education.

This paper is an attempt to propose a guiding framework for students and teachers undertaking inquiry learning. The proposed framework is intended, on the one hand, to help students learn to categorize and manage the information they collect on the Web; and on the other hand, to help teachers to better manage students' inquiry learning process. However, this guiding framework is still in a conceptual stage and its effectiveness is yet to be empirically tested and further study regarding its applicability is called upon.

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