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Helping Students to Become Disciplinary Researchers Using Questioning, Social Bookmarking and Inquiry-Based Learning

Jamie Wood
Department of Religions and Theology
University of Manchester
jamie.wood@manchester.ac.uk

Abstract

This article investigates the role of questioning in inquiry-based learning (IBL). The intention was to improve students' questioning skills, to develop their conception of the importance of questioning in their learning, and to impact positively on their information literacy. The context was a first year-seminar course in the History Department at the University of Sheffield (UK). Students were asked to 'bookmark' sites (including scholarly articles and primary sources) that they had found on the web during their weekly readings and to pose questions arising from their reading to a discussion forum. Data on students' conceptions of questioning were gathered via pre- and post-module questionnaires and standard module evaluations. This information was coupled with evidence gathered from a reflective diary that the tutor completed on a weekly basis. Students perceived that they had developed a range of transferrable and discipline-specific skills through this approach. There was a perceptible shift in many students' conceptions of the role and importance of questioning in their learning.

Keywords: first year, History teaching, IBL, information literacy, inquiry-based learning, questioning, research skills, social bookmarking

Introduction

This article reports the impact of a combination of inquiry-based learning (IBL) pedagogy and a social bookmarking website on students' learning in first year seminars which I ran in the History Department at the University of Sheffield in 2009. These innovations addressed two issues. First, many of the approaches to student use of the internet which I had encountered as a student, and anecdotally from speaking with

teaching colleagues, seemed to consist of warning students about the dangers of Wikipedia and other online information sources. I wanted to improve student use of the internet using a more constructivist (and constructive) approach. Second, I was struck by how little pedagogic attention was paid to questioning, an area which is acknowledged as central to both the IBL and the research processes, and was interested in seeing how I could develop students' questioning skills.

On a practical level, I wanted to know what work the students had done outside of class *before* we met up for the weekly seminars. In the past I had often turned up to class only to find out that many of the students either had not read the texts which I had painstakingly photocopied and handed out the week before or had read them but had done little *thinking* about the content. Diigo (http://www.diigo.com), the social bookmarking site, made it possible for me to track what the students had done and what they thought about it in advance of seminars and thus to tailor the seminars to the students' knowledge and interests.

Inquiry-Based Learning and Questioning

IBL is a student-centred and active pedagogy that seeks to engage students in self-directed research into the subject matter and problems of their academic and professional disciplines (Kahn & O'Rourke, 2004). IBL is related to problem-based learning, an approach in which students are presented with a problem, to which the teacher usually expects a given solution, and are guided through the process of addressing that problem by a facilitator (Barrett, 2005). IBL is typically more 'open' than PBL: students are given greater freedom to define for themselves both the questions they will address and the process by which they will engage with those questions. IBL has its roots in social constructivist epistemologies, which emphasise the importance of the active and experiential construction of knowledge by the subject and the fundamentally social nature of this process (Dewey, 1938, Vygotsky, 1962, 1978).

Developing the disposition towards 'self authorship', an outlook that involves the questioning of trusted authorities, moving away from comfortable ways of viewing the world to exploring multiple perspectives and constructing one's own beliefs and values is increasingly seen as one of the most desirable outcomes of a university education (Baxter-Magolda, 2009). Most outcomes of higher education, such as intercultural

maturity, critical thinking, decision-making, and responsible citizenship, hinge on the capacity for self-authorship and it has been suggested that IBL and research-based pedagogies develop in students such knowledge, skills and dispositions (Brew, 2006), which are essential to negotiating a modern world that is typified by 'super-complexity' (Barnett, 1999, 2000, Levy, 2007).

Many commentators have suggested that questions sit at the heart of the inquiry process (e.g. Spronken-Smith, Angelo, Matthews, O'Steen & Robertson, 2007). Hutchings has been one of the most eloquent proponents of this view:

> *The core of enquiry is the question, and it is in the formulation and/or the analysis of that question that the important initial intellectual activity takes place... If specific questions can produce absolute answers, then there still remains an infinity of subsequent questions. Open-ended questions are inherently infinite. Learning is thus an unceasing process.* (Hutchings, 2007, p. 10)

Hakkarainen and Sintonen (2002) concur, characterising IBL as a question-driven process of seeking understanding: 'without a research question there cannot be a genuine process of inquiry' (p. 27). However, although there are plentiful resources available on developing the questioning skills of teachers and on how to encourage students to ask questions in class (e.g.www.economicsnetwork.ac.uk/handbook/gta/32), there are few descriptions of pedagogies that deliberately seek to inculcate a questioning disposition in students. Despite the widespread agreement about the importance of questioning in IBL and for the development of students' disciplinary skills (Hanlon, 2005), there are relatively few studies exploring the impact of inquiry-based approaches to the development of students' questioning skills. This study was designed to remedy these limitations in the existing research.

Inquiry-Based Learning, Web2.0 and Social Bookmarking

Web2.0, or the 'social web', describes a number of online technologies such as blogs, social networking sites, social bookmarking sites, and wikis that facilitate active engagement on the part of the user and collaboration with peers. Significant and increasing attention is being paid to the potential affordances of social bookmarking and other Web2.0 technologies in higher education (Armstrong & Franklin, 2008, Minocha,

2009). Research has suggested that Web2.0 technologies are well-suited to supporting inquiry-based pedagogies because of their open-ended nature and the fact that they require active engagement from students (Armstrong & Franklin, 2008, pp. 47-48, 62, Wood & Ryan, 2010). The collaborative potential of both Web2.0 and IBL, particularly at undergraduate levels, means that we should expect a strong degree of convergence between technology and pedagogy.

Social bookmarking is a method for Internet users to store, organize, search, and manage bookmarks of web pages on the Internet. Users save links to web pages that they want to remember and/or share. These bookmarks are usually public, although they can be made private or shared with restricted numbers of people. Most social bookmark services encourage users to organize their bookmarks with informal tags instead of the traditional browser-based system of folders. Social bookmarking services are potentially useful for building and sharing Internet resources between groups of students and there have been a number of instances of their deployment in higher education, for instance in the collection and sharing of research materials between students on a module (Armstrong and Franklin, 2008). Importantly, scholarly and peer-reviewed articles on sites such as JSTOR (www.jstor.org/, an online system for archiving academic journals) can often be bookmarked. In the History discipline a large number of primary sources are available on the open web. This means that students can be encouraged to engage in genuine academic research into reliable primary and secondary sources.

Potentially, social bookmarking is very well aligned with IBL. It requires active engagement from students to construct and organise their resources. The social aspect means that students can be encouraged to engage in both individual and collaborative research. The fact that activities take place in a virtual space using virtual resources reduces pressure on material resources. Finally, the ability to share bookmarks, to annotate and (re)organise information, and to comment on each other's work raises the genuine possibility for the collective discovery and construction of disciplinary knowledge by students in collaboration with each other and the tutor.

Inquiry-Based Learning, Student Research, and Information Literacy

Information literacy is the ability to find and use information effectively in any given context, encompassing 'higher-order capabilities including critical evaluation, synthesis, ethical judgement and communication as well as technical skills in information searching and the use of technology' (Levy et al, 2010, p. 26). As such, information literacy is essential to the support and development of inquiry-based pedagogies, which are predicated on the engagement of students in research or research-like activities and seek to develop students' research skills.

Uncritical student use of the Internet for what are supposed to be academic research activities is a familiar bugbear of teaching staff across all disciplines. While many members of staff see persistent student use of Wikipedia and Google as a serious problem, research suggests that a significant number of students continue in practices established before entering higher education despite efforts to modify their behaviour (Armstrong & Franklin, 2008). Patrick's (2008) report on the topic of student use of internet gateways demonstrated that students did not think that they relied overly on internet resources anyway. If the students do not think there is a problem with their use of internet sources then it is more difficult to modify their behaviours.

Instead of attempting to change behaviour didactically – i.e. by telling students what not to do – it might be more profitable to think about adopting pedagogies which allow students to explore digital resources independently, to help them to resolve such issues individually and collaboratively with the support of tutors. Reid-Bowen and Robinson (2008) deployed a constructivist approach with a first-year cohort to improve students' study skills, including the use of online resources, but report that this still led to some problems with referencing and continued plagiarism. Blackwell and Martin (2009) engaged students in actively searching for information in digital archives, constructing archives, and conducting research on the primary materials in the archives. Norcia (2008) adopted a similar strategy when engaging American Studies students with a digital archive at Lehigh University: students collaborated to create historical and social frameworks for texts in the archive, in the process developing subject-related competencies, information literacy, research skills, and deepening their understanding of the discipline. Morley (n.d.) encouraged students to engage actively and critically with

Wikipedia rather than simply forbidding them to use the site. Students explored the way Wikipedia entries are constructed, corrected entries which were inaccurate and created their own entries. As a result of the activity students became increasingly critical of existing Wikipedia entries, improved their subject knowledge and awareness of the contested nature of that knowledge, and their referencing skills. Brockhaus and Groom (2007) report that engaging students in collaborative knowledge creation through writing Wikipedia entries together improved information literacy, understanding of the research process, and increased the quality of their research and writing. Hanlon (2005) describes encouraging students to work with online digital archives when writing essays. The open approach which he adopted allowed the students to address their own research problems instead of responding to tutor-set questions which directed their inquiries in pre-defined directions.

Implementation 2008-2009

In 2008, I combined a social bookmarking site, delicious (http://delicious.com/), with a blog (http://wordpress.org/). Although this approach had considerable benefits for the students and the tutor, there were some limitations with the services (for evaluation of this approach, Wood & Ryan, 2010). Diigo seemed to offer a better range of features and more integrated functionality to support student inquiries and questions and therefore this service was adopted in 2009.

The intervention described in this article occurred in the second semester of the 2008/2009 academic year. I was leading two separate seminar groups, each running for one hour per week (there were also two lectures each week). Assessment for the module was via individual oral assessment (17%: two short presentations and a mark for general oral contributions), essay (33%), and exam (50%).

Aims, Research Questions and Methodology

The inquiry-based use of the social bookmarking service (diigo) was intended to provide students with opportunities to practice and develop their questioning skills, to encourage students to use the web efficiently and effectively, and to allow me to see what the

students had done in advance of the seminar classes and therefore to increase the relevance (and hopefully interest) of the classes for the students. The project addressed the following research questions:

- What is the role of questioning in IBL?
- How do first year History undergraduate students' conceive of the role of questioning in their learning?
- What is the impact of an inquiry-based use of social bookmarking on students' research skills and information literacy capabilities?

I adopted an action research methodology to develop the teaching approach and to evaluate the impact of these innovations on student learning. Action research is a reflective process of progressive problem solving aimed at improving teaching practice, often conducted with the aid of a 'critical friend' (McNiff, Lomax & Whitehead, 2003, Whitehead & McNiff, 2006). For the purposes of this project, I defined as 'questions' both statements explicitly formulated as questions and other statements which are presented to stimulate discussion and/or research. I completed the University of Sheffield's internal ethical review process. Data were collected using the following methods: students completed questionnaires at the beginning and shortly before the end of the course, I compiled a reflective diary on a weekly basis, standard module feedback forms were also collected and reviewed.

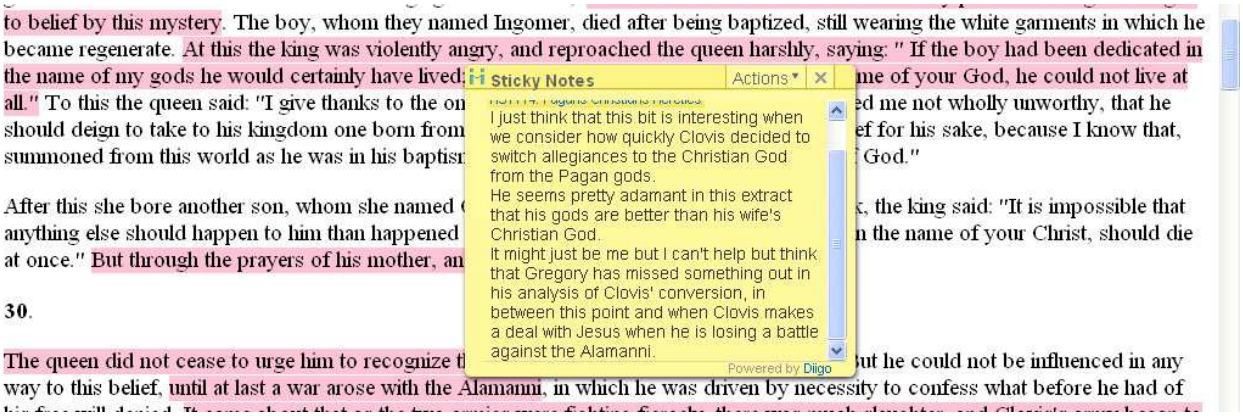
Teaching and Learning Approach

I began by signing up for a 'diigo for educators' account, which enabled me to set up a private group for the students enrolled in the two seminar classes. Each of the students was given a separate login, which meant that I was able to monitor student contributions. Access was restricted to members of the group and the students' work was not visible to the rest of the Internet.

For their weekly independent work, students were asked to locate online resources (primary and secondary sources) connected to the following week's seminar topic and to bookmark them using the diigo account. The exact activities and types of resources varied from week to week (see appendix for details). The basic pattern was that students would bookmark the site(s) they had found. This involved adding a title, a short

description of the site and a series of descriptive 'tags' to the digital bookmark. They then shared their individual bookmarks and comments with the diigo group. In some weeks they were also asked to use diigo to highlight and comment on relevant sections of individual web-pages. This was made possible because diigo allows users to 'highlight' and add 'sticky-notes' to specific sections within websites. After conducting their independent research, students posted a question based on their reading to the discussion forum in diigo. The resources, questions and other information in diigo were then fed into discussions and activities in seminars. I completed the same activities as the students in order to model what was required. Collated resources were shared across the two seminar groups to give greater momentum to the process of engagement. This also eased the administrative load.

Figure 1. Diigo sticky-note attached to highlighted section of text



Various support structures were put in place to promote engagement with questioning. Specific activities (beyond the simple fact of having to pose questions repeatedly) were designed to support the development of questioning capabilities (these are summarised in the appendix). There were several opportunities for the students to reflect on the role of questioning in their learning through class discussion and the completion of questionnaires. The opportunity to see other students' questions proved to be valuable because the students were able to learn by comparing their efforts with those of others.

Engagement

There were nineteen students in the two seminar groups. Over the course of ten seminars, 147 posts were made to the discussion forum (the majority of which were questions) and 314 bookmarks were added to the resource list in diigo, making use of

590 different tags (some of the bookmarks and tags had been transferred over from the delicious account I had used in 2007/2008). There was an average of around 8 discussion board posts per student over the course of ten seminars, although this average masks a degree of variation between individuals, with one student only making two entries, while several students posted ten entries or more. The majority of students grasped how to use the technology and were comfortable with completing the weekly activities.

Pre-Module Survey

Prior to the first use of diigo students were given a questionnaire that asked them a number of questions about their thoughts on the role of questioning in learning. Unfortunately, only six of the nineteen students completed this survey. Five of the students preferred for questions to be set by the tutor rather than the students setting them, although one did have a different conception: ‘It is good to set the questions ourselves as I feel it makes us think more about what we're doing and we're able to focus on areas which interest us.’ All students were of the opinion that questions were either ‘very’ or ‘quite’ important to their learning, and were content with being given the opportunity to set the questions for discussion in seminars. The students were also positive about using an online discussion forum to support their questioning and interaction, although there was some concern about technical aspects of diigo.

Post-module Survey

After the module had been completed students were again given a questionnaire. This focused on the issue of student questioning with additional questions about the skills that students perceived they had developed through using diigo. The response rate improved considerably to fifteen (out of nineteen). Students also completed a standard module evaluation form, from which I include relevant responses below.

Results

Experience of Using Diigo

From a tutor's perspective, the experience of using Diigo was very positive, which is repeatedly affirmed in the reflective diary:

> *This software enabled me to do what I had never been able to do effectively – get the students to highlight the text and then physically point it out to their fellow students. The added benefit here is that (a) it saves paper and (b) it is saved and viewable by the whole class (and me) for a long time.* (Reflective diary, week 5)

Asking the students to do a manageable and varied amount of work each week, both inside and outside of class, seems to have been appreciated and resulted in the students doing extra work, as the following comments from the general module feedback reveal:

> *Using the diigo site encouraged more preparation and meant I always did the work.*

> *Because of the constant homework and diigo participation I think my preparation has been much better here than elsewhere in the course.*

Students did not recount many difficulties or negative aspects of the approach, although two responses, one from the post-seminar questionnaire and one from the general module feedback, noted that they did have some technical problems: 'At first I found diigo and the bookmarking system difficult and this affected my preparation'.

In general, the students were positive about diigo. They felt that it facilitated the collaborative generation of ideas and had practical use in preparing for essays. The approach gave them greater 'freedom of choice about what to read', and they enjoyed being given the opportunity to find their own sources: 'I like how it's not always reading long pieces of text and how we have to find our own sources'. There was also a perception that the inquiry-based use of social bookmarking promoted a different way of learning: 'it is much more interesting, and because you are not only reading, it is easier to absorb the information.'

In the general module feedback two respondents noted the different approach taken in these seminars, but suggested that 'It may have been useful to still have traditional seminar reading to do to ensure key historians were covered.' This comment is interesting as it suggests that by the end of this seminar series some students were still concerned that the tutor should direct them to the resources. However, it is important to note that (a) in the course of their research on the internet the students did encounter many of the most significant historians of our period, although perhaps I could have emphasised more clearly that this is what they had achieved in the classroom sessions, (b) the students were provided with a very detailed course bibliography by the module convener and could easily have found key historians in that document – indeed, this is what many of them did when writing their essays and preparing for seminar presentations, (c) directing the students to these resources would have undermined one of the main objectives of the seminar series – to empower them to find and use resources for themselves.

Questions and IBL

Significant change seems to have occurred in students' ideas about who should set the questions that direct their inquiries. Despite the small sample size, the first questionnaire, administered prior to the use of diigo, suggested that students preferred that the tutor take responsibility for establishing questions. By the end of the seminar series, students were evenly split into three groups (five students each). First, those who still felt that questions should be set by the tutor. This group felt that tutors should set questions because gives direction, is reassuring for the students, makes sure what the students are doing is relevant and useful, gives focus to student research, links seminars to lectures, and can help with new areas of study. In addition, there was a concern that student questions might not be challenging enough and a feeling that staff questions are more likely to lead to a 'good' answer.

A second group of students were in favour of a mixed approach: sometimes questions should be set by staff and on other occasions they should be established by students:

> *A mixture is best to make sure key themes are not overlooked by setting your own questions gets yourself and others thinking more.*

A final group felt that students should set their research questions. These students felt that it would generate more interest, give students more control over their learning, open up discussion, and allow more room for the exploration of topics of which students are uncertain.

> *I prefer setting the questions myself, mainly because it forces us to think about the issues in different ways, with the diigo site because people are reading sources in different ways so a wider range of issues comes up.*

The majority of students felt that being given the opportunity to pose questions, share them with their peers and see what their fellow students had done was very valuable. This seems to have promoted collaborative learning, broadened perspectives on the topic under consideration and aided creative thinking:

> *it has been good to see what other people have put and there was probably more variation in the questions than if the tutor was to set them,*

> *it allows you to see a wider range of issues that come up from sources - some that you may not even have thought about,*

Research Skills and Information Literacy

12 of the 15 students who responded to the post-module survey felt that the approach improved their research skills. They articulated this in a variety of ways. The need to locate articles and sources meant that the students improved their skills in the use of online databases and search engines and increased their awareness of where these research tools are located:

> *normally the reading for seminars is set for you, whereas we often have to find our own reading for this seminar...I have become much more adept at using JSTORs search functions.*

> *it has made me more aware of where sources can be found, i.e. not just JSTOR.*

Increased engagement with the sources was reported by another respondent: ‘having to highlight and tag has meant I have considered them [the sources] in depth.’ Partly, these positive impacts seem to have been the result of repetition: ‘I've searched for more primary sources and articles than I have before.’ Another student reported an

improved ability to use the sources, stating that they became 'better at extracting quotes from articles.' Other students said that their analytical skills improved:

> *I think I'm better now at analysing how useful a source might be and how you can use it.*
>
> *..it forces you to think about the source material and be analytical in response to it*
>
> *…makes you read the article properly as you have to think about it*

Thinking in greater depth about the reading 'opens up the area of reading to different paths of thought' and encourages students to consider how it related to lecture topics as well. Especially significant in terms of History, a discipline which requires students to engage with sources on a number of different levels and something which many first year students struggle with, is the following:

> *with reference to primary sources. The course puts more focus on primary sources than any module so far, and they were a bit of an abstract concept before…I feel better able to find, evaluate and use them now.*

Students as Historians

Activities inside and outside of class also seem to have been valuable for the development of students' sense of themselves as historians:

> *they've helped me understand what is necessary in a History essay rather than a Philosophy essay.* (General module feedback)

Because students were conducting inquiries into reputable research resources this meant that they were engaging with the content of the discipline as a matter of course and developing their subject knowledge. Indeed, giving students control over their research seems to have encouraged them to try to develop their understanding:

> *because we were encouraged to find our own reading meaning that we could cover topics we did previously not understand.* (General module feedback)

Assessment

Although at the outset of the project I was not intending to focus my research on the role of assessment in student learning, on reviewing my reflective diary I found that it was one of the most prevalent issues in my thinking. The linking of in-class exercises to formative and summative assessments (unassessed essays and assessed exams) helped to maintain student engagement in the classroom and homework activities.
I was careful to align the amount of homework that the students had to do with their assessments. They were given less homework in weeks when essays were due. In-class activities were designed to develop specific skills (e.g. writing thesis statements) and these were introduced (or 'sold') to the students as being directly relevant to their exams and essays. The students were particularly enthusiastic when I suggested that we focus the final session on the exam instead of on a thematic element of the course, as previous presentations had been. In the final session student presentations were therefore specifically designed to revise the course as a whole, while the in-class activity involved groups working on past exam questions and feeding back to the rest of the group. This was meant to replicate the planning process the students should go through in exams, to help the students to realise how much they already knew, and to practice skills inculcated throughout the seminars (arguing in response to the question, structuring an essay). Student feedback from the standard module evaluations confirmed the usefulness of the explicit linkages between classroom work and the development of skills that would be relevant to assessments:

> *I learned a lot about writing specifically to argue.*
>
> *Stressed importance of thesis statements and structure and how to formulate a strong argument.*

Discussion

Student feedback on the use of diigo to support IBL has been very positive and this is backed up by my observations of the work which they produced both inside and outside the classroom. Krause (2007) has suggested that for the 'net generation' learning styles characterised by fluency in multiple media and valuing of collective seeking, sieving and synthesising experience and information are more valued than individual information

absorption and will become increasingly important in the future. There is no doubt that the approach adopted in this article developed these kinds of skills, including: competence in online collaboration, technological skills, and information literacy and research capabilities.

However, the use which was made of diigo did not simply improve students' transferable skills, a large number of disciplinary skills were also developed. For example, the need to summarise large pieces of text into the small summaries required for the descriptions in diigo and the ability to use sources effectively are fundamental historical skills (and possibly key skills for higher education). Similarly, the activities in diigo were useful in encouraging the students to engage directly with the primary sources of historical inquiry, especially when we reflected collectively on these resources in class.

Students also responded positively to being given the opportunity to discuss their practice as historians:

> *[…] the students really came alive when given the opportunity to talk with each other about their essays and share stuff.* (Reflective diary, week 7)

Perhaps most importantly, by encouraging students to ask questions based on their independent research and then feeding those questions into further research activities in class, students were encouraged to engage in inquiries that closely modelled disciplinary research processes from the first year of their university careers.

> *I guess this homework […] represents a good mini-version of deciding upon a research topic for a bigger assignment – you start with a 'topic' area, possibly given by the lecturer, then do some initial reading/ research, then devise a question based on that.* (Reflective diary, week 5)

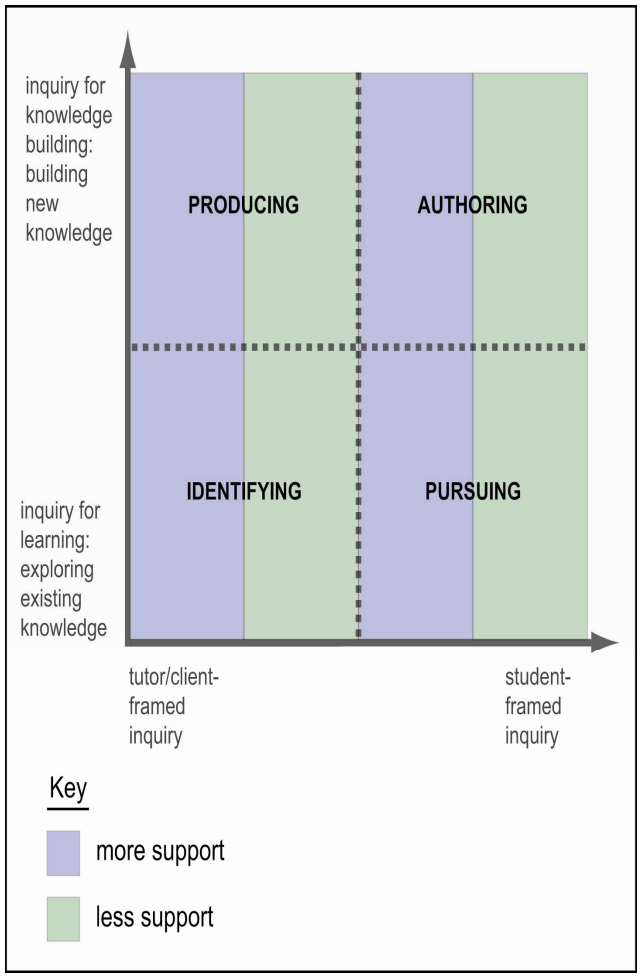
Approaches which encourage students to set and answer their own questions from the first year level have been adopted successfully elsewhere, particularly in North America (e.g. Justice et al, 2007).

Here it may be useful to refer to work which has been carried out by researchers at the University of Sheffield into first year students' experiences of research and inquiry

across a range of disciplines (Levy & Petrulis, forthcoming, 2012). The research suggested that providing students with opportunities to engage in open inquiries early in their studies has significant benefits for developing their conceptions of research and knowledge-building, although the majority of students did not experience such pedagogies to a significant degree in their first year. Based on this research, four 'ideal type' modes of IBL were identified. They are labelled *Identifying, Pursuing, Producing* and *Authoring* on Figure 1 below and represent three broad factors in pedagogical design: 'the status of student inquiry in terms of knowledge-orientation (vertical axis), where primary responsibility lies for establishing the inquiry question or theme (horizontal axis), the level of 'process support', or guidance and structure, provided (mapped on to each quadrant)', (Levy, 2009).

Figure 2. Modes of Inquiry-Based Learning (Levy, 2009)

***Authoring*:** Inquiry tasks are designed to encourage students to explore their own open questions, problems, scenarios or lines of inquiry, in interaction with a knowledge-base ('how can I answer my open question?').
***Producing*:** Inquiry tasks are designed to encourage students to explore open questions, problems, scenarios or lines of inquiry, framed by teachers, or others such as an external 'client', in interaction with a knowledge base ('how can I answer this open question?').
Pursuing: Inquiry tasks are designed to encourage students to explore a knowledge-base actively by pursuing their own questions, problems, scenarios or lines of inquiry ('what is the existing answer/response to my question?').
Identifying: Inquiry tasks are designed to encourage students to explore a knowledge-base actively in response to questions, problems, scenarios or lines of inquiry framed by teachers ('what is the existing answer/response to this question?').



The approach I adopted maps well against the 'pursuing' quadrant on the above diagram. The students were asked to generate their own research questions and to

develop their own online resource list in diigo. These then structured their inquiries and provided the information base into which they inquired. The activity was designed principally to engage with existing disciplinary knowledge through gathering and interacting with secondary and primary sources. In general, students were given a significant degree of freedom in how they followed their inquiries in class, though support and direction were provided, particularly at the outset.

Garrison (2007, p. 65) defines 'cognitive presence' as 'the exploration, construction, resolution and confirmation of understanding through collaboration and reflection in a community of inquiry.' Such metacognitive skills are highly important in the domain of online enquiry, but these skills are usually weak in novice learners (Quintana, Zhang, Krajcik, 2005). It is thus important that students are given the opportunity to explore and develop these skills as early as possible in their studies, preferably in collaboration with each other and with facilitation from a tutor. I suggest that this is exactly what we were achieving with the use of diigo for collaborative IBL. Because the structure required the students to conduct research, summarise, and ask their own questions, they were encouraged to reflect on the material, to process it and to present it to their peers. The effect of this was to lessen the possibility that students who had done the reading would turn up for class without much idea about the actual content of what they had read – by processing the material they engaged on a higher level and were more likely to contribute usefully in class. Likewise, by encouraging students to think about the role of questioning in their learning they had to consider not just *what* they learnt, but *how* they learnt.

For me, the changed perception of questioning was the most important part of the whole experience. It is fine to recognise, as much of the theoretical literature on IBL does, that questions sit at the heart of the student learning experience, but if we do not develop pedagogies which support students in developing a questioning outlook and give them opportunities to practice asking their own questions, there is something wrong. When I first thought about adopting this approach in late 2007 I wanted to see what would happen if students were allowed to ask questions in a supported environment. I have come to realise that letting students ask their own questions is difficult precisely because the question does sit at the core of many learning experiences, especially those which involve research. Giving away control of the process of setting questions is

problematic because it is closely connected to strongly held-student – and I predict that the same holds true for staff – beliefs about who should take the lead in any educational experience.

Conclusion

Web2.0 and the rapid pace of technological change present educators and students with significant challenges and opportunities (Selwyn, ed., 2008). However, Krause (2007, p. 4) suggests that despite their almost ubiquitous use 'we are yet to see evidence of the transformative impact of ICTs on curriculum and pedagogy in higher education', noting that there is an increased interest in blended learning which combines online and face-to-face interactions and allow students to make optimal and seamless use of both. This is exactly the kind of approach which I advocate and attempted to implement in my own teaching (see appendix).

The intervention reported in this article was experimental and small-scale. Nonetheless, there are strong indications that the use of social bookmarking to support IBL has had a positive impact on student learning (or at least their conceptions of their learning). I would like to make a number of observations by way of conclusion. First, the inquiry-based use of social bookmarking had a significant impact on students' research skills. The openness and student-led nature of the searching was experienced by the students as unusual, interesting and motivating. The fact that the bookmarks were shared resulted in a perceived economy of effort and greater motivation. The cognitive processing which was involved in a relatively small activity (adding a short description and a few tags to each bookmark and then writing a question) was of immense value in terms of subject knowledge, engagement and preparation for class.

Second, the questioning activities in which the students engaged (repeatedly writing questions based on their own research and being encouraged to reflect explicitly upon the role of questioning in learning) developed the majority of students' perceptions of the role of questioning in learning. Whereas students had previously expected tutors to set questions, there was greater variation after the intervention described in this article, with a shift towards more student-led question-setting. It is interesting to speculate whether such perceptions would be carried over into the overall educational process.

Are those students whose perceptions of questioning developed now more open to student-led learning experiences?

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Appendix 1. Activity Matrix

Session	In-class activity	Homework (individual)
1	• In pairs, students log in to diigo and practise using the site: post a bookmark and add a comment to the forum. • Tutor emphasises that objective is not to find the 'best' sources or the 'right' answer, but to engage with the tool.	• Repeat class activity. • Watch video of recently aired historical documentary online.
2	• Reflection on tagging, useful information to include, layout of title. • Concept mapping exercise: class chooses 1 question from the forum, divide into pairs and brainstorm responses to the question, writing their responses on post-its (each pair had different coloured post-its), post-its then attached onto the write-on wall in the classroom, students read and review responses and clarified where necessary (each pair had to explain at least one of their post-its to the group), extra thoughts and links were marked on the wall, each pair was then given 20 sticky-dots to 'spend' on whichever they thought were the most significant factors (each pair was a different colour again, for identification, time limited to force rapid decision-making), each pair explains their spending decision.	• Identify 1 primary source and 1 secondary source linked to the weekly topic, bookmark them and post a question to the forum.
3	• Discussion of differences between primary and secondary sources based on homework. • Brainstorming a response to one of the posted questions (selected by tutor). • Tutor explains the point of the homework questioning: that it reinforces the students' learning.	• Add 2 highlights and comments to a site which tutor had preselected and bookmarked in diigo in response to a question set by the tutor. • Add a question to the forum.
4	• Homework question introduced before presentations and students encouraged to make notes on the presentations in response to the question. • 3 questions selected by the tutor from the forum, students divided into three groups, each group addressed their question and prepared a short presentation (1-2 minutes) for the group.	• Add 1 highlight and comment (explaining why the text they had highlighted was important) on a primary source website which the tutor had bookmarked in advance. • Add a question arising from the reading to the forum.
5	• Student pairs chose one of 4 'issues' (identified by the tutor but based on the questions the students had posted to the forum), pairs were directed to relate the content of the weekly presentations to this issue. • Issues structure subsequent discussions within the pair, pairs then identified extra relevant details within the webpage they had highlighted for homework, highlighted and commented upon them in diigo and presented back to the rest of the class.	• Students find and bookmark one secondary source, from a choice of two topics, write a 50 word summary of that website and add 5-10 descriptive tags to it • Post a question arising to the forum.
6	• Tutor presents handout on 'thesis statements', together with an example taken from one of the student essays (with permission), identifying the lack of a thesis statement as a common problem and explaining what a thesis statement is. • Students vote to select questions to be addressed in seminar (from those posted to the forum). • In pairs, students consider the seminar question while listening to the presentations (and jot down ideas onto flipchart paper). • Discussion of the question, with focus on generating a thesis statement. • Students divided into groups, each of which has to plan an argument in response to the question (including a thesis statement), present this argument back to the group, tutor summarises this on the whiteboard.	• Students read essay feedback, find an online resource (e.g. website on essay writing skills) that is relevant to the feedback and bookmark it. • Post a thesis statement to the forum that better addresses the question they answered for the essay.
7	• In 3s/ 4s students do a 'sorting exercise' (looking through 20 separate questions taken from past papers): students group different types of questions together, explain to other groups the selections they made, reflect on the kinds of answers (and essay structures/ thesis statements) that such question types demanded.	• Students annotate a primary source by (a) highlighting 1 section of it, (b) commenting on that highlight • Post a question arising to the forum.

	• Class discussion of essay-writing and structuring (sharing of practices and experiences). • Examination of 1 past paper questions in detail, focussing on how to deconstruct question and structure answer.	
8	• Students directed to devise 1 question each for the presenter/ class/ tutor to consider, these were used as a basis for class discussion. • In 2s/3s students make drawings based on what they had heard, discussed, or done for homework, and presented them back to the class, tutor feeds back and emphasises the learning which had occurred as a result of this work.	• Students identify 1 source (primary or secondary) on the weekly topic, bookmark it, then add relevant title, description and tags. • Post to forum response to the following questions (reflecting on the course as a whole): 'the most interesting thing I've learnt on this course is…', 'this course raises the following question for me…' • Fill in a questionnaire asking them to reflect on what we had been doing so far, particularly the questioning activities.
9	• Students fill in feedback template while presentations were occurring (including: topic/ 1 thing to take away/ 1 question the presentation raises). • Small group discussion after presentations. • Brainstorming of counter arguments to the thesis of the student who was presenting. • Sharing activity based on the essays the students had handed in earlier in the week: students circulate and fill in a template with details of 3 other students' essays (including: topic/ title, what their argument was, 1 thing to take away).	• Exercise where students write different sorts of questions based on Bloom's taxonomy (handout with short description of the taxonomy, example questions, and an exercise requiring practising different questioning levels) • Bookmarking exercise: students had to find 1 relevant non-written source (podcast, picture, video clip, song), in the descriptions of the bookmark they had to explain/ argue why they had chosen a source that was not immediately 'historical' and how it was related to the seminar or to the course as a whole.
10	• Students fill in feedback template while presentations were occurring (including: topic/ 1 thing to take away/ 1 question the presentation raises). • Discussion of exam through review of 3 past papers, students divided into 2s or 3s and chose a question, preparing a short essay plan for presentation back to the group.	