The Use of Social Bookmarking by Health Care Students to Create Communities of Practice

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Abstract. Teaching and learning health and social care in a digital age produces many challenges for students and their teachers. A common hurdle for healthcare students and practitioners is the sheer amount of information that they have to make sense of. Another challenge is where this information is captured and stored, with people utilising personal, as well as institutionally owned devices. A potential solution to these problems is the use of social bookmarking applications such as "delicious", where users can create a centralised repository of online resources, share them with other users, and view what others are bookmarking. This paper describes research conducted at the University of Greenwich involving 160 participants across three Schools and 5 modules, including Health and Social Care who were encouraged to integrate social bookmarking into their learning and teaching. Participants were instructed to tag their resources with an appropriate module code tag e.g. NURS1297 so that a repository of module specific bookmarks was created. Over a 4 month period, 160 users created 1430 bookmarks with 5032 tags. Further analysis of the bookmarking behaviour is discussed along with reflections on the suitability of social bookmarking to create digitally literate health care communities of practice.

Keywords: Social bookmarking, tagging, eLearning, Web 2.0, communities of practice, connectivism, heutagogy, digital literacy.

1 Introduction

A common problem for students studying health related subjects in Higher Education (HE) is that they can access the web on any number of devices which do not necessarily have automatic syncing of bookmarked web pages enabled. There is also a related issue of sharing, as well as discovering relevant online resources [1]. A potential solution to these problems is a social bookmarking application, where users can create a centralised repository of bookmarked resources, share them with other users and view what others are bookmarking. The popularity of these systems has become of increased interest to information architects and has prompted a number of studies into the use social bookmarking and the related field of collaborative tagging [2],[3],[4]. Results from these studies suggest that tagging and bookmarking share

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similar features to more traditional indexing systems [2] but also contain extra dimensions such as tags related to time e.g. “toread” and task or users’ emotional responses to a document e.g. “cool”, which conventional indexing systems do not support [2].

One of the most popular online resources that supports social bookmarking is “delicious”, a social bookmarking website which “allows users to tag, save, manage and share web pages from a centralized source” [5]. The main advantage of these services over traditional bookmarking systems such as those included in the majority of web browsers e.g. “favorites”, is that the need for synchronizing bookmarks between multiple computers and browsers is no longer required. This is a common problem for students in HE, in particular those from health and social care courses who are on placements and who access the web on any number of machines and devices, in any number of locations. Although a number of browsers have bookmark synching capabilities (either in-built or via plugins), this is often not available on HE or NHS maintained machines due to security or privacy concerns. A related benefit is the ability to categorise resources in multiple categories, by the use of tags, which is only partially supported by web browsers in the form of “bookmark folders”. A consequence of the use of tagging that is potentially useful for students, lecturers and practitioners is the ability to discover and share resources via these tags. For example tagging resources using the course codes of a degree program gives students a central access point (e.g. http://delicious.com/tag/NURS1297) for all relevant online information for that course. If all students then use the appropriate course code tag when bookmarking during their own personal research, both students and lecturers will collaboratively produce a list of online resources for that course.

This paper describes the results of a project that aimed to utilise the delicious website to investigate the use of social bookmarking and tagging in an educational setting by students and lecturers.

2 Research Questions

The main objectives for this project were to investigate the best methods for integrating social bookmarking into everyday practice for both students and teachers, and to then determine behavioral usage and motivations. The following were the proposed research questions for the project:

1. What patterns of user tagging activity emerge through analyses of tagging frequency and co-word analysis? (based on [2])
2. What patterns of user bookmarking activity emerge through analyses of the resources bookmarked and the tags used to bookmark them?
3. What is the temporal distribution of bookmarking during an academic semester?
4. What types of tags are being used i.e. do students/lecturers utilise task and time related tags?

5. What are the levels of use of social bookmarking in relation to resource discovery i.e. do students browse/follow fellow students bookmarks and tags to discover resources?
6. What are students and lecturers perceptions of the advantages and disadvantages of social bookmarking and tagging?
7. What are the motivations for using social bookmarking services?
8. What features are currently missing from social bookmarking websites?

The following section describes the two methods that were used to answer the research questions described above.

3 Methodology

3.1 Participants

In total 160 people, comprising 5 lecturers and 155 students on 5 modules across the Schools of Computing and Mathematical Sciences, Engineering and Health and Social Care, participated in this study. Courses ranged from Masters (Level 7) to first year undergraduate (Level 4) and comprised of around 10 students to over 100. Students ranged from novice computer users to relative experts i.e. students who already had an undergraduate computing related degree. Courses ran from various points in September to the end of the semester in December 2010.

3.2 Materials

All students were provided with introductory materials, which were developed with a pilot group, and delivered through lectures, tutorials and YouTube videos. These resources introduced learners to the social bookmarking project and to the delicious social bookmarking tool.

An initial interesting finding was the use of the term "bookmarking". During the first introductory talk to a group from the School of Health and Social Care, one of the researchers compared "social bookmarking" to "browser based bookmarking", outlining the advantages and disadvantages of both approaches. It became apparent however that students did not understand what "browser based bookmarking" was, primarily due to the fact that the majority of students used Internet Explorer as their default web browser, which utilises the term "favorites" instead of "bookmarks"[1]. Following this, the term favorites was used in the introductory material, alongside bookmarking, to avoid potential misunderstanding.

A further finding at this stage was the need for two different sets of instructions. A step by step guide was produced with detailed instructions and screenshots of each stage of the sign up, adding bookmarks and tagging resources process (totalling around 14 pages). Although a number of students appreciated these materials, others

[1] The term "bookmark" is used in the majority of other web browsers such as Firefox and Chrome.

suggested that they would prefer a one-page set of instructions, which highlighted the key stages, which was then produced.

3.3 Procedure

In September 2010, all lecturers introduced social bookmarking to their students using the materials described above. The only prescribed usage was that students and lecturers were instructed to tag any resources that were related to a particular module with the appropriate module code e.g. NURS1297. This then enabled a module specific set of resources to be created and made available at a single URL on the delicious website e.g. http://delicious.com/tag/NURS1297. Students were encouraged to use delicious to store and find useful resources for each module, with lecturers employing a number of strategies to motivate continued use. These included the production of a number of different visualisations via the tool described in section 3.3.1, as shown in figure 1 below which were shown to the students during lectures and tutorials to demonstrate the course's current bookmarking activity.

Fig. 1. Visualisation of bookmarking activity in the form of a tag cloud from NURS1297, a course entitled "Principles of Learning Disability Nursing across the lifespan"

3.4 Automated Collection and Analysis Tool

One particular advantage for researchers in this field is that in addition to a user facing service, delicious also enables programmatic access to the information stored on the site. This is enabled by an Application Programming Interface (API), which supplies a number of XML/JSON based web services. This means that the collection and analysis of users' bookmarking and tagging behaviour can then be automated.

As described by Kipp and Campbell [2], the basic component of delicious is the bookmark entry made by each user upon encountering a website of interest. In addition to the URL of the website, the user can enter a title, some notes and a number of tags. All of these details along with the username and the date the bookmark was added can be accessed via the delicious API. An analysis package was therefore created with PHP and MySQL that stored any bookmarks that were tagged with the relevant module codes, along with the username, the additional tags, any notes and the timestamp.

This analysis package produces descriptive and visualised statistics, co-word matrices and frequency data for all bookmarks created as part of this study, as well as for individual courses.

Descriptive statistics included: the total number of bookmarks created by users; the most popular bookmarked resources and websites; the total number of tags and the total number of unique tags.

Visualisations included: annotated time line charts showing the temporal distribution of bookmarks; tag clouds highlighting the most frequently used tags; geographical location of bookmarked resources (estimated by the reported location of the server of the site that had been bookmarked).

4 Results

4.1 Descriptive Statistics

160 users across the 3 Schools created 1,430 bookmarks with 5,032 tags from August 2010 to the end of January 2011. A certain amount of agreement between respondents was demonstrated with only 1,069 unique tags being used (21%) and the 1,430 bookmarks being comprised of 882 distinct url's. 58% of bookmarks (829) contained notes about the resource that had been added by the user. The figure below shows the normalised temporal distribution of bookmarking activity for the duration of the project. There were initial peaks of activity in August, with the pilot group and then in September when social bookmarking was introduced to students in all of the modules. In the first full week of the semester (w/c 27th September) 468 bookmarks were created.

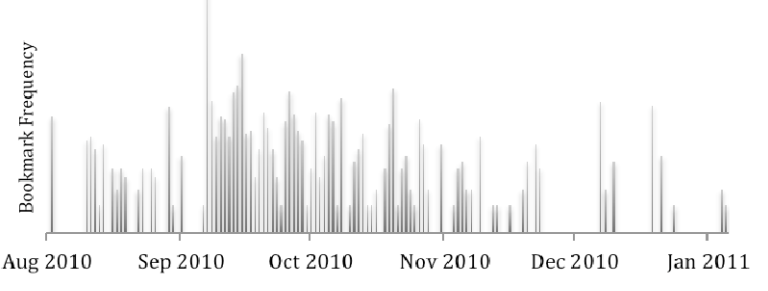

Fig. 2. Normalised temporal distribution of bookmarking activity

Activity gradually declined from the initial launch in September with 488 bookmarks being created in October, 180 in November and 71 in December (although this includes the Christmas holiday). Although all of the modules stopped in December, the delicious website was still being used by students with 42 bookmarks being created in January 2011.

The types of tags used were dependent on the domain of the module but generally give a good descriptive overview of the subject area of that discipline. For example,

when considering the co-word matrices for each tag, the tag "NURS1297", relating to the module "Principles of Learning Disability Nursing across the lifespan", co-occurred most frequently with the tag "learningdisabilities" (40 times). Within that module, other frequently co-occurring tags were "communicationdifficulties", "intellectualdisability" and "learningdisabilities".

The number of tags used per bookmark ranged from 1 to 17, the distribution being shown in Figure 3 below. The majority of bookmarks (266) were tagged with a single tag, with the average number of tags per bookmark being 3.5.

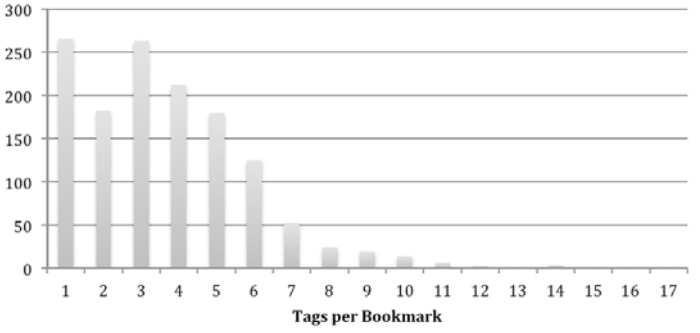

Fig. 3. Total number of Tags per Bookmark

The following table shows numbers of users with how many bookmarks in total they created e.g. 2 users created between 50 and 59 bookmarks.

Table 1. Number of bookmarks created by users

Number of Bookmarks	Number of Users
140-149	1
50-59	2
30-39	1
20-29	12
10-19	36
1-9	108

Although the majority of users created between 1 and 9 bookmarks, over 59% of users (94) created 5 or more tagged resources during the duration of the project.

Analysing the health related courses separately revealed similar activity levels and behaviours to the results as a whole, across the 3 Schools.

4.2 Survey Results

At the end of each module in December 2010, students were asked to complete an online survey to measure the impact on learning and teaching. 81% of respondents said that they used delicious to bookmark web pages as good resources with 46%

saying they used delicious to share resources. Around 30% indicated that they used delicious to find relevant resources. Interestingly only 49% found resources via the module code tag with 77% finding resources via tags related to the module i.e. subject related tags. Around 70% of students viewed other students' bookmarked resources.

84% of respondents stated that they would use the delicious website again, with 89% of those students saying they would use it for University related activities. Pleasingly, 70% of respondents said that they would recommend delicious to a friend and 68% said they'd recommend it to other learners. 52% would recommend it to professional colleagues. Although not a main objective of this project, 49% of students felt that using delicious had improved their ICT skills.

The qualitative feedback generated from the questionnaire was generally positive, relating to both storage and discovery of information.

5 Discussion and Conclusion

The results from this study indicate that social bookmarking has a number of positive outcomes with regards to teaching and learning, across a number of disciplines related to eHealth. Students and lecturers found the tool to be useful for storing, sharing and discovering resources. Through the process of using specific course code tags, both students and lecturers have created their own learning communities or communities of practice. The formation of these learning communities enables them to share information relating to their own specific course subjects, with their peers. The year on year building of a repository of information in effect provides students with an online searchable database for its members to access [6]. It also provides students the opportunity to discover and share the views and perspectives of their fellow members.

In this study, students were not limited to accessing their own learning communities; there were opportunities for students to create and join other learning communities. This was achieved by users utilising their own specific descriptive words when tagging (as "module codes" were chosen in the project to establish learning communities), or by joining existing ones. The latter can be achieved by the students finding others who use identical tags as themselves, relating to the students' own interest. This means individuals can share resources with other 'like minded' people who have similar, or the same interests [7]. Through the tagging process students can discover additional resources that they may not have necessarily found themselves (77% of students reported that they found resources in this way), thus leading to a group of people forming their own learning community [6].

The advantages of learning communities include individual users being able to access these groups at a time and place which is convenient to them, on a 24/7 basis. In this study, students were not restricted as to when and where they could access and use these learning communities, which became increasingly important when students were on placements. Additionally, through the process of using "notes", students can share views with one another about the various resources users have bookmarked, helping students to develop their critical evaluation skills.

It is noted however, the level and extent of participation as a member within each of these learning communities is dependent on the individual. Some students chose only to

participate a few times, whilst others used their communities more often. Users do not receive any feedback about whether their tagged resources have been used by others [6], perhaps explaining why there are some who chose only to consume the resources rather than contribute to the community. Although bookmarking activity decreased during the duration of the project, a key indicator of success is the building of the repository itself, as opposed to the number of contributors. The work of Ortega et al. [8] suggests that in collaborative resource creation applications such as Wikipedia, there is a great level of inequality "with less than 10% of the total number of authors being responsible for more than the 90% of the total number of contributions". From this study, supposing that creating over 10 tagged bookmarks is a reasonable level of contribution, then 33% of users achieved this level. If we reduce that level to 5 tagged bookmarks then 59% of users have made an active contribution.

The utilisation of social bookmarking is an example of how learning communities can be created where its members can store and share a collective range of resources for others to share. This could be seen as encouraging not only the development of learner independence and autonomy but a range of related graduate attributes which are valued by employers. Further to this, the emergence of these communities demonstrates how social interaction within health care subjects in HE is progressing.

Future work will include identifying specific improvements that could be made to the delicious website and functionality that is currently missing e.g. improved support for critical evaluation of resources. The project will be continued in the following academic year with other modules as well as an investigation into how social bookmarking can be used within VLE's such as Moodle.

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