

INNOVATION BRIEF

Can personal digital knowledge artefacts' management and social networks enhance learning?

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Abstract

This paper examines the use and management of personal digital artefacts as a possible enabler to create social networks for learning. The emergence of social networking applications for managing and sharing digital artefacts on-line from URL bookmarks to Web-feeds has facilitated the creation of social networks. This paper suggests that these tools could be used for education, and similar tools could become features of e-learning applications. The paper proposes that e-portfolios could become a suitable hub for integrating such tools for educational use. It will be argued that through sharing one's digital knowledge artefacts with other learners one not only brings on-line learning in a social context that it is sometimes missing, but also allows new paths of learning with peers to emerge.

Keywords: Personal knowledge management, social networks, learning, tag, folksonomy

1. Introduction

This paper focuses on the near future and looks at how empowering social networks could improve learning and education with information and communication technologies (ICT) through new web-based tools. The tools used on the web are becoming more varied. On the one hand there is the entry of Web-publishing tools such as weblogs, wikis, podcasting, vlogging (videoblog) and on-line journals, on the other hand there are tools for the creation of knowledge artefacts and social networking (section 3.3). These tools, combined with powerful Web-feeds¹ generation and aggregation as well as tracking services, change the ways people communicate on the web². Currently these tools are entering into formal educational settings and bring new ideas for learning in a networked environment empowered by social networking. Moreover, these new tools enforce another change: the boundaries between informal and formal (usually institutionalised, provided for a purpose of a diploma, etc.) learning are getting less pronounced. How can we capitalise on this for educational purposes and to enhance learning? What could be the pedagogical implications of applying social software for education?

This paper is comprised of five sections. The first section looks at the use of e-portfolios and suggests that they should not only be used as an educational tool, but rather a tool for lifelong learning to bridge the gap between formal and informal learning as well as to bridge between passages from one learning setting to another one. Then we will look at some current social software applications and reflect upon how they could be applied for educational purposes. Then we discuss e-portfolios as a possible convergence hub to bring social networking aspects into e-learning applications, and lastly we look at the questions for future development.

2. E-portfolios for e-learning

Learners create "digital traces" such as writings, images, multimedia files, blogs and other reflections over the time of lifelong learning [1]. These traces can be part of the process of learning (how and what do we learn), an end-product or an outcome of learning, or used for assessment and validation purposes. These digital traces of learning can also be called digital knowledge artefacts i.e., any process or object resulting from human activity.

Portfolios are commonly used in education³. The ongoing transition from the paper-based portfolio to the digital formats carries many promises, if also downsides, since the concept of usage changes radically with the new media. Thus a variety of portfolio formats and usages has emerged. The EPICC typology⁴, for example, comprises four different usage types such as assessment, showcase, development and reflective portfolios [2]. These definitions are fairly general and it is common

¹Web feeds are commonly in the RSS, RDF, or Atom formats <http://en.wikipedia.org/wiki/Webfeed>

²These are tools for Web 2.0: the read-only web becomes read/write system. No well-defined definition exist yet, but a good lead can be found by Danah Boyd:

http://www.zephorio.org/thoughts/archives/2005/09/05/why_web20_matte.html

³Books on Professional Portfolios or Higher Education:

<http://electronicportfolios.org/portfolios/bibliography.html>

⁴European Portfolio Initiatives Co-ordination Committee: <http://www.epiccproject.info>

that different types overlap with one another creating hybrid portfolios.

How e-portfolios are actually used in formal and informal educational contexts is still covered sparsely. The EPICC- projects collects narrative accounts of e-portfolio usage scenarios on various educational levels to improve our collective understanding on this topic⁵. It appears that the e-portfolio usage varies from reflective and pedagogically oriented usage to re-organising education and its assessment. Also, the administrative usage for storing digital information about the learner and possibilities for the accreditation by 3rd parties are becoming more common.

In whatever manner digital portfolio or e-portfolio is understood, nowadays we talk about it as something that learners can “carry” along all throughout their life as they move from one educational level to another or progress in their working carrier. E-portfolios and their content can represent a variety of things [3]. They can:

- present one's “learning career” and display information about the characteristics of the learner
- demonstrate achievements and prior-learning for job or study opportunities
- create a repository of learning products and artefacts of reflection
- give a digital presence on the Web to manifest one's cultural identity
- create a platform to participate in the community for lifelong learning to keep reflecting on current issues, etc.
- Organising and managing one's knowledge artefacts could be part of the learning experience (process, product, validation), too. This section looked at the use of e-portfolios, whereas the following one will focus on the phenomenon of social networks.

3. Social Networking gone to the Internet

The social network perspective encompasses theories, models, and applications that are expressed in terms of relational concepts or processes. The unit of analysis in network analysis is not the individual, but an entity consisting of a collection of individuals and the linkages among them [4].

Since 2002 social networking has gone on-line with various Internet applications [5]. It mainly started in networks of friends and dating services, but has nowadays gone far into new territories such as business-relations, accelerating sales processes and improvement of organisational learning [6]. Also social software applications have moved to mobile networks, the term being Mobile Social Software (MoSoSo). The current generation of emerging applications (see section 3.3) focuses on empowering networked group knowledge through connecting people together, usually through matching user profiles, interest areas and through list of friends and friends of a friend.

Social networks supported by social software on the Web function more or less as a

⁵Scenario Building, <http://insight.eun.org/innovation>

recommendation tool allowing social navigation and collaborative filtering⁶. Storing personal bookmarks on-line, for example, allows people not only to access them from whatever computer connected to the Internet, but also arrange them using personally meaningful keywords. But most of all, allowing other people to access the bookmarks online makes the big difference as opposed to having them saved locally. Browsing content this way (i.e. social navigation) introduces an important concept: recommendations based on social networks [7]. This offers a whole new dimension to the world of information retrieval. Instead of querying a large pool of data using search keywords, one can actively receive recommendations that are based on other like-minded people, trusted friends, etc. This, so to say, helps to discover the “long tail offerings” [8].

3.1 Tags to allow a higher degree of social networking

Since the later half of 2004 the communities on the Internet have embraced a practice of manually tagging content with metadata which produced a phenomenon described as folksonomies [9]. Until now, metadata has been known as an element attributed to librarians and information architects to manage large pools of data such as collection of books, archives, etc. Now, however, metadata has become rather trendy in organising personal digital information and artefacts by using simple keywords without hierarchies. Whereas in the domain of information architecture and retrieval, the artefacts stored in databases and information systems are usually described with conventional metadata⁷ according to a standard with controlled vocabularies and taxonomies, the new trend of folksonomies allowed users and user communities to describe and classify digital artefacts by using the keywords that they felt were suitable. Hence the term folksonomy, a combination of folk and taxonomy. These keywords, called tags, are now commonly used by a plethora of application for organising and tagging pictures, bookmarks (URL), blog entries, Web-feeds, and other digital content items on the Internet.

The benefits of the use of tags are many fold:

- tags could be used to manage and classify one's own digital knowledge artefacts in a meaningful way (classify and management),
- tags could be used to link people together with similar interest (link),
- tags allow people to share their digital knowledge artefacts with people that they choose (share),
- tagged artefacts could be used for making predictions and recommendations for new information needs and interests based on the known facts about person's prior-knowledge, interests and actions (recommend),
- tagged artefacts could be used to create a federated network of personal repositories. Parts of the personal repositories could be made available to other learners using the same channels that are used for learning object repositories that use conventional metadata, and nowadays also more metadata generated by the third party. Ways to use tags should be investigated too. This combination would allow the creation of social networks by linking people together to share the artefacts both for formal and informal

⁶http://en.wikipedia.org/wiki/Collaborative_filtering

⁷Such as DCMI Metadata or IEEE Standard for Learning Object Metadata

purposes. This type of linking could better imitate the multitude of social networks that people have in real life and also enable the creation of new learning paths beyond the conventional means of learning design. (distribute)

Tags can also be seen as important for personal knowledge management of digital artefacts as they potentially could give an alternative to the somewhat restrictive folder structure that we know from the use of PCs where an artefact can only exist in one place. As tags are essentially flat lists, an artefact can have multiple attributes, thus it could exist or be connected to many places better illustrating its relations in real life (e.g. a paper from Matt about e-learning could be tagged as Matt and e-learning and be found from both entries, but in a folder structure it could only be saved either in the "Matt" or "e-learning" folder, if not duplicated).

Furthermore, it could be expected that in the future as convergence of formal and informal learning increases and learners create more digital traces, a big part of educational content will be end-user products created by learners themselves through the application of end-user authoring tools. These resources could be saved and stored in personal repositories throughout the whole learning career. The use and re-use of these knowledge artefacts for learning could be enhanced by the use of personal knowledge management tools and social networking tools that will be described later in this section.

3.2 Social Content and Social Context

A plethora of recent on-line tools use tags for the above listed reasons. One main purpose of these tools is to allow people to organise their personal knowledge artefacts (content), whereas the networking and interlinking of people through networks gives us the context where this takes place. The terms Social Content and Social Context are used by a social networking specialist Stowe Boyd [10]. By Social Content he means any information that people create about themselves to share with others such as preferences, postings, manifests of relationships (either self-proclaimed such as FOAF⁸ or machine-generated based on data mining such as one's emails or other analyses⁹). This could be extended to contain all the digital artefacts that people create both for formal and informal learning.

On the other hand Social Context centres on a person's heterogeneous social networks; people are known to have a variety of networks, ones being though their social life whereas others might be based on interests in professional life, in hobbies and such. How to capitalise on this multitude of networks and contacts for the purpose of facilitating social networking is a challenge for current applications. Creating social protocols as we experience them in real life does not translate easily to a form of a software application. Social Context in this paper has been extended to explain how the tools and applications listed below facilitate the creation of networks trying to imitate the real-life social protocols that users have.

3.3 Tools for knowledge artefacts and social networking

The following is a short summary of some current applications that fall into the category of tools for creation of knowledge artefacts and social networking. They are explained briefly by using the terms Social Content and Social Context as explained

⁸ Friend of a Friend: <http://www.foaf-project.org/>

⁹ An example of a commercial usage: <http://www.linksy.com/>

above. Furthermore, some illustrations are given on how the tools could be used for educational means following the five points laid out above regarding the benefits of tags (classify, link, share, recommend, distribute).

The intention is to list different types of tools to expose ideas on how they could be used in an educational setting. Furthermore, this exercise allows us to envisage how similar tools could be incorporated in educational applications to enhance learning in a networked context, and hence, the functionality of the application itself is not as important as the idea and its innovative usage. Blogs and other end-user authoring tools are not mentioned in this list, as they are outside the scope of this paper. A good reference on the subject can be found by S. Downes¹⁰.

3.3.1 Flickr.com (<http://www.flickr.com>)

Short description: Flickr is an online photo management and sharing application with two main goals: to help people make their photos available to the people who matter to them, and to enable new ways of organising photos. Flickr is a Yahoo! company.

Social Content: Photos with rights (Creative Commons¹¹) and restricted access, tags, user profile, can define groups and create communities.

Social Context: Private and public groups, social navigation through tags (latest, most popular, tag cloud). Web-feeds(user/tag), a third party API¹².

Possible Educational implementation: Learners can share images that they have created or integrate in their works (photos, image manipulation, maps,..) to be used in different learning situations from authentic geography to art lessons. Social networks can be built around images through connecting learners, tutors and teachers together via shared tags. Pictures can constitute an important network of distributed repositories for images.

3.3.2 Furl.net <http://www.furl.net>

Short description: Furl's marketing line is to "Save, search and share your Personal Web." It allows users to save a URL and a personal copy of any page on the Web, tag it using keywords and to share it with others.

Social Content: Social bookmarking: bookmarks, tags, creation of list of subscriptions to other people's bookmarks and subscribe people to yours.

Social Context: Private groups, navigation (latest, most popular, hot topics, people who have this also have this and that..), PeopleRanksm (what's popular), recommends new Web pages guided by the sites the user "Furled", Web-feeds(user/tag), a third party API.

Possible Educational implementation: Sharing personally classified bookmarks among teachers and with other learners to cover a study area. Collaborative filtering and social navigation facilitates new discoveries. Teachers and librarians can already create pre-selected and tagged lists of resources for learners to browse, and be sure

¹⁰Article for references by Downes, S.: Educational Blogging, EDUCAUSE Review, 2004

¹¹<http://www.creativecommons.org>

¹²Flickr API: <http://www.flickr.com/services/>

that they are found again, as a copy is saved by the system. Bookmarks based on a tag can be aggregated and posted through Web-feeds to learners' and other teachers' blogs or websites focusing in a given area. Commenting and rating on bookmarked urls can be used for recommending as well as for helping decision-making and critical thinking.

3.3.3 Del.icio.us <http://del.icio.us>

Short description: del.icio.us is a social bookmarks manager. It allows adding web pages to your personal collection of links, to categorise those sites with keywords, and to share your collection not only among your own browsers and machines, but also with others.

Social Content: Social bookmarking: bookmarks, tags

Social Context: Navigation (latest, most active, tag cloud, by people, others who have this tag,) Web-feeds (user/tag), a third party API

Possible Educational implementation: del.icio.us is more geared towards "social bookmarking" than Furl. Collaborative collection of links tagged with keywords is facilitated, and they can all be browsed and viewed at once (social navigation) or distributed through Web-feeds. Also, creating related tags is easy, giving more leverage for more elaborated categories.

3.3.4 Technorati <http://www.technorati.org>

Short description: Technocrati is an information retrieval application, a self-proclaimed authority of the blogosphere where it keeps track of tags that people have used in their blogs and of hyperlinks between different blogs. Tracks thousands of updates per hour to monitor the communities (who's linking to whom).

Social Content: User creates watchlists for tags – the service indexes blogs using tags, i.e. a search engine for blogosphere.

Social Context: Search all the bolgs containing a phrase, a URL, a tag. Navigation (most popular, news/books/movies/top100 blogs, tag cloud in all languages, related tags)

Possible Educational implementation: Technocrati can be used to track postings on the blogs on certain tags, the similar could be envisaged for educational ends. Also, it illustrates who is linking to the page the user is on, thus allowing a means to follow the whole distributed discussion that happens in people's blogs, this contrasts with a more traditional use of a one centralised forum for discussions. This service can also help a user to evaluate the trustworthiness of blogs as it can show other people linking to it.

3.3.5 Rojo.com <http://www.rojo.com>

Short description: RSS feed reading and discovery with commenting and sharing though keywords and established groups.

Social Content: RSS feeds: find, track, read and share feeds through tags

Social Context: Allows setting up groups, also sharing through tags. Recommended

Links though Rojo.

Possible Educational implementation: In the future we can expect that an increasing part of educational content is end-user products, thus learning artefacts created by learners themselves become an important component of learning process. It could be envisaged that learners were to generate selective (privacy and rights) RSS feeds from their own learning artefacts e.g. blogs, photos, bookmarks, etc. and other learners could aggregate feeds through tags and social networks like done in Rojo.

3.3.6 ConnectViaBooks.com <http://www.ConnectViaBooks.com>

Short description: Social networking site using books (reviews, read/reading lists,..) to connect people.

Social Content: User profile including preferences, location

Social Context: Connecting people who have listed the same books, by geographical location, too.

Possible Educational implementation: The application could be used as such for literature. Furthermore, if we think of the idea of connecting people with similar learning "histories" we could expand it to learners who have taken the same courses or used the same learning resource, etc. This combined with social networking could allow recommendation of further resources, courses, career options, etc, and also allow people to get together to discuss books, courses, etc. and to share their experiences with peers. The geographical location of users also allows to find like-minded people in the region, a neat feature for educational usage too.

3.3.7 "43 Things" <http://www.43things.com>

Short description: A site that provides an area where people can write their goals, become inspired by others and share their process as well as learn from others how to achieve goals.

Social Content: Lists of life goals, desired things to achieve and places that people plan and wish to visit. Also "have done this" and user profile.

Social Context: Connections are build between people who have listed similar aims or desires in order to have a peer group to support one another. Connections can also be made between people who want to achieve some goal and the ones who have already done that in order to give guidance and support.

Possible Educational implementation: In an educational context writing down educational goals is an important part of planning one's learning path. Peer-support from people with the same goals can help achieve the setting of targets and sharing the experience. The feature "have done this" would allow learners who have gained certain experiences to act as tutors or help in the scaffolding process.

3.3.8 360° Yahoo! <http://360.yahoo.com>

Short description: Yahoo!'s service for blogging and networking, allows sharing all types of artefacts, also the ones on external services, with public or restricted groups.

Social Content: Own profile, blog, photos, local reviews, friends, music, lists of favorite books, movies, music, TV shows and groups. A personalised page collects different artefacts either from Yahoo! Services or external ones.

Social Context: Groups (private, friends, friends of a friend, etc) can be created and categorised and artefacts can be shared with groups through Web-feeds, notifications on a messenger, etc.

Possible Educational implementation: Creating accounts for an educational community and to use it for reflection on blogs and sharing information as well as links and such can support community building among learners and allow them to share things beyond everyday learning. The integrated approach is appealing, although not intentionally geared towards educational usage, as for example School Plaza¹³, a newly launched service by European Schoolnet.

3.4 Emerging trends in the usage of knowledge artefacts and social networking tools

One growing trend in managing and sharing digital artefacts through social networking tools and practices seems to be the use of a combination of the services mentioned above; it is common to see multi-users in the blogosphere. Managing one's digital identity and artefacts in numerous different locations might appear cumbersome as the user faces different log-ins and interfaces. However, the workflow of adding, managing and viewing these artefacts is increasingly getting less sporadic and more integrated.

First, these applications are mostly web-based and can be accessed through a standard browser meaning that there are less executable applications to be installed on one's computer. Almost by default applications offer a "button" or "bookmarklet" that can be integrated into the toolbar of a browser to operate. For example, adding a bookmark requires only one or two clicks, which means that one does not need to leave the browser window and launch a new application. The browser, evidently, gains more importance with these kinds of add-ons of which the Firefox extensions¹⁴ are a good example.

Second, many applications use Single-Sign-On and also provide a third-party API. This has increased the integration possibilities and allows users to access many of the applications through one interface, thus offering more continuity of interaction throughout the workflow. For example Flickr allows you to post to your blog directly. APIs also have spurred the development of new applications based on services provided by these tools¹⁵. Additionally, some tools for identity management in social-networking are appearing [11].

Third, other users' contributions are increasingly consumed through the subscribing to Web-feeds. Thus, the need to access one specific application or a website for photos, blog postings, and the like becomes obsolete. Again, the browser or a Web-feed reader proves to be an important place for the aggregation of Web-feeds from other users.

¹³ School Plaza: www.schoolplaza.org

¹⁴ <http://www.mozilla.org/extensions>

¹⁵ OpenCourseware Finder mixing del.icio.us and OpenCourseware at <http://opencontent.org/ocwfinder>

On the other hand, contrary to the above mentioned stand-alone-one-purpose applications, one could predict a trend of “converged” applications. Yahoo!’s 360-service, for example, integrates many of the features of stand-alone applications into a “converged” service. This might indicate a direction that some major service and platform providers envisage for the future. A few issues could arise from that; as the complexity of this type of services increases with the number of new added features, the end-users might face some repellent usability issues (simplicity vs. complexity). Also, some major companies occasionally impose their own proprietary standards. This would quickly put the interoperability gained from the use of open standards in jeopardy. However, with sufficient attention given to design aspects and by committing to the use of open standards this could be avoided.

This section looked at the phenomenon of social networks and named some applications. Moreover, some ideas of the use of these applications for educational purposes were outlined. The next section envisions a merger of e-portfolios and social networking tools.

4. E-portfolio as a hub for social learning networks

As it was outlined earlier in this paper e-portfolios have many different applications in education, and they keep gaining in popularity. At the same time there is a strong trend on the Internet of new social networking applications that allow the management and distribution of digital artefacts and/or their metadata through many decentralised services. The next developmental step could be to investigate the merger of the two trends for the benefits of learning, for example, under the name of e-portfolio.

The idea would be based on two pillars: an e-portfolio should be the central place from where people could manage both their informal digital artefacts (such as photos, blogs and bookmarks), and their formal learning artefacts (such as transcripts and accreditation) no matter where they are located. Shortly, it should be the place where the learner’s learning history, present and future can be found. Secondly, the learner should be able to make available his or hers knowledge artefacts in a decentralised architecture. This information should be available to other learners through suitable social networking applications while keeping the intellectual rights and taking into account privacy and security concerns. This would allow the creation of social networks that would support, enforce and guide learning [12]. Similar ideas about the allegory of learning as a network (Connectivism [13]) are expressed and discussed on the blogosphere¹⁶.

E-portfolios of the future should contain concepts handling the followings:

- provide a repository for personal knowledge artefacts,
- provide tools to manage one’s personal knowledge artefacts by categorising them using novel approaches such as tags, ratings, but also more conventional forms of metadata,
- generate and aggregate metadata and feeds about personal knowledge

¹⁶<http://www.technorati.com/search/connectivism>

- artefacts and distribute on a variety of services and devices (allowing social networking as well as sharing the knowledge artefacts),
- provide an architecture that allows learners to access content (e.g. other users to access learner's as well as for learner to access outside repositories) through different modalities taking care of rights management, security and privacy concerns,
 - connect to different services that could be for educational content, courses, applying for jobs, etc.

To achieve this, efforts to work with wide user communities and compliance to open standards should be envisaged. Some work towards the establishment of conceptual frameworks in this area is already carried out in initiatives such as E-portfolio Interoperability Framework¹⁷ by the EPICC-project, and other work within the E-Learning Framework (ELF¹⁸). The ELF aims to develop a service-orientated approach to the development and integration of computer systems in the sphere of learning, research and education administration and has managed to bring together a wide user and developer community.

5. What next?

Personal knowledge management in the context of learning is probably an issue that is less discussed nowadays, but one that will gain more public interest as learning management systems and e-portfolios are rolled-out in education on a wider scope. Being able to organise one's own knowledge as learning progresses, to create personal repositories of knowledge artefacts, and to enhance and enforce new ways of learning through social networks will be one of the future challenges (classify, link, share, recommend, distribute). New efforts should be put into researching the importance of personal knowledge management in the context of learning with ICTs. It could be predicted that social software and tags as described in this paper play a major role, even driving the development.

Envisaging e-portfolios as a hub or platform for such tools in the future might help us to start realising that ICT can actually act as an enabler to enhance the social aspects of e-learning. This would happen by bringing new possibilities for learners to learn from like-minded peers, trusted people, friends and tutors who the learner can connect with through the use of the next generation tools for learning. Assuming that such tools were used for learning, it is worth noting that they carry many consequences on the way that learning experiences are planned and designed, how learning process and results are presented, assessed or used for employment purposes.

However, given the slow speed of change in education, the use of social networking applications will probably start gradually as the leading-edge teachers and students start using these tools. What comes to integrating these features into e-learning applications some have taken the course into that direction already, the ELGG for the use of e-portfolios as a hub and QSIA for social recommendation, to mention a few [14]. Integration of these features on the larger scale requires not only rethinking of

¹⁷<http://www.eife-l.org/portfolio/interop/>

¹⁸<http://www.elframework.org/>

pedagogies, technologies and usability issues, but also organisational and socio-cultural aspects related to the user communities and users' skills. This carries consequences for the e-learning policy practices, too. It would be useful to collect usage scenarios and visions in real learning situations to better understand the potential of these tools and features.

The future directions for research in this field could include issues such as what the pedagogical implications of social software for education are, its usability in the context of learning and especially in issues of accessibility, privacy and security. Furthermore, integration of services into both centralised and de-centralised architectures should be investigated. Moreover, the area of metadata gains further importance as it will not only be used for conventional ways for classification, but also for the creation of learning networks to support different ratings, recommendation and advisory models in educational context as well as to feed information for the systems utilising adaptive learning principles. Likewise, it would be interesting to investigate how hybrid models of conventional metadata would work with folksonomies.

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Acknowledgement:

This work is part of the outcomes of European Portfolio Initiatives Coordination Committee (EPICC), a project funded by the European Commission in the framework of the e-learning programme. The paper is an input for ICL 2005 Conference, Villach, Austria. Thanks for comments and inspiring discussions go to EUN members and staff, EPICC members, ProLearn Summer School Conference participants and to Matti.

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