

The use of Wikis in Education - a review of the literature

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Abstract

This paper reviews the literature surrounding the use of Web 2.0 in education. It examines various perspectives of what Web 2.0 means, and how Web 2.0 can support a constructivist pedagogy. Case studies involving Wikis are examined and the problems experienced are considered from both a technological and a group-working perspective. The paper concludes that although Wikis have the potential to support social-constructivism the differences between artificially constructed learning groups (formal learning) and self-forming and emergent social groups (informal learning) result in a requirement for greater attention to the theories on group working when creating group tasks using Wikis for learning purposes. Wikis are a tool and do not, by themselves, result in satisfactory collaboration.

Introduction

The World-Wide-Web has revolutionised the way humans interact with each other and with information. Since the dot-com crash of 2001, a new model of the web has emerged with even greater potential for collaborative working. The ability to create and share information electronically affords new opportunities to education, and these are being increasingly used in schools and universities across the world. This review seeks to understand how pedagogical theory and management practices match the Web 2.0 tasks that are being set in formal learning environments.

The “Dot.Com” crash

The late 1990s saw rapid growth in internet based businesses. The new

technology was seen as exciting and innovating and the demand for shares in dot.com businesses surged – despite very few of them actually making any profits (Schiffers, 2007).

Businesses on the world wide web became vastly overvalued on the stock markets because of the allure of the technology and not the profitability of the business conducted or the soundness of their business plans. This state of affairs could not be sustained, and the effects of the market crash in 2000 are still being felt today. Indicative of this is that as of writing in 2013, the FTSE share index has still not regained its peak of December 1999.

The lesson is that technology is a means to an end, and alone should not be expected to deliver results. This could be true for educational uses too.

What is Web 2.0?

The term “Web 2.0” has no simple meaning. It was first used at a media conference to distinguish between web-based businesses that had failed in the dot-com crash of 2000, and those that had, to the contrary, flourished and made the world wide web “more important than ever” (O’Reilly 2005). In their analysis they concluded that Web 2.0 sites could be described as services that exhibited key characteristics, including:

- Continual improvement and development
- The harnessing of collective intelligence
- The importance of large quantities of data
- The presentation of a rich user experience

Examples of Web 2.0 interfaces

Google is an example of such a service. The Google search interface evolves with the addition of new features. As you type keywords Google tries to predict which keywords or websites the user wants from a list of popular searches and results and, with the user having revealed their current interests, targeted advertising can be supplied as well.

Google also combines data from its search engine with its mapping data and aerial photography. This is now further combined with street-level photography (Google “StreetView”); and it is all accessed through their website which provides an interactive and dynamic interface that responds to individual keystrokes and mouse movements as the user is working. This contrasts with the original message-response paradigm which presented web pages as complete units.

Technology plays a key role in delivering these services, and authors with a technological perspective can equate Web 2.0 to the presence or use of specified technologies such as blogs or wikis (Anderson 2007, p5).

Blogs are personal “web-logs” or diaries in which users can post their thoughts, reflections and ideas over time which form a sequential record. Other users can subscribe to blogs and be kept informed of new entries which they can read and comment upon. Where two or more users subscribe to each others' blogs, a channel for communication is formed. This need no longer be solely a plain text communication, as multimedia "blog" services, such as Flickr, are now available.

A wiki is set of web pages that can be edited by a group of users. One user can create a new page, other users can edit, add to, or delete the text on that page. The wiki keeps a history of all changes, and contributors can add comments to the history as to what changes they have made and why. Wikis can become very large repositories of collective knowledge. *Wikipedia* (http://en.wikipedia.org/wiki/Main_Page) is a large wiki of nearly thirty million web pages (four million English pages) that is maintained by nearly 19 million contributors across the world (Source: <http://en.wikipedia.org/wiki/Wikipedia:About>). Not everyone contributes to every page - using a Marxist philosophy: each author contributes content to the best of their ability to those areas that are within their talent and knowledge. The outstanding success of Wikipedia provides an example of what can be achieved collaboratively.

This ability to read and write information to the web in multiple media has allowed the phenomenon of social-networking to arise. Facebook is a social-networking

site that allows users to create a profile of themselves, post a blog (now known as their "timeline"), post and manage photographs and videos. More importantly, the ability to create links to other Facebook users through the "friend" option creates social groups in which users can interact with each others' timelines - creating web-based conversations and socialisation.

The two-way passage of data to and from the web has led to it being called the "read/write" web - and it is this ability, together with the opportunities for communication, collaboration, and working in social groups, on sites such as Facebook, that has raised the interest of educators. As Anderson points out :*"Ultimately, the label Web 2.0 is far less important than the concepts, projects, and practices included in its scope"* (Anderson 2006).

For example, Huang and Nakazawa (2009), describe how blogs, wikis and multi-media-sharing utilities create collaborative learning opportunities; Karasavvidis (2009) consider blogs, wikis, podcasts, social bookmarking, photo sharing and instant messaging as Web 2.0 tools which lead to a "proliferation of possibilities for communication and collaboration".

The pedagogical theory behind this interest is social-constructivism.

Constructivist Pedagogy

Cognitive constructivism involves learners creating their own knowledge and understanding from their own observations, perceptions and reasoning capability (Holmes & Gardner 2006, p83). Learning occurs in stages, with a learner able to progress from a prevailing level of knowledge to new levels that are within reach (what Vygotsky (1978) calls the "Zone of Proximal Development") . This often occurs under the guidance of a "more knowledgeable other" that provides metaphorical "scaffolding" to support the learner's knowledge building.

It is the need of the "more knowledgeable other" that extends cognitive constructivism by introducing another need for the learner - i.e. people - and this has become known as "social constructivism" (Holmes & Gardner 2006, p84).

The "other" can be a learner or a tutor, but the theory proposes that learning takes place in an authentic situation which provides purpose and motivation to the learner. According to Holmes & Gardner (2006, p84) the main elements of social-constructivism are that it is:

- Social
- Reflective
- authentic
- scaffolded
- progressive
- experiential
- situated (i.e. contextualised)

Hazari et al (2009) note that the Chickering & Gamson (1987) principles of good practice can be covered by wiki technology. By design, learning activities using wikis are active and develop reciprocity and cooperation among students, with emphasis on time-on-task. Furthermore, with suitable management of the activities they can also communicate high expectations and exploit the diverse talents and ways of learning of the group members. These principles are consistent with the social-constructive pedagogy.

Based on social-constructivism, Gunawardena et al (1997) outline a five-phase model for a socially mediated knowledge construction process (Figure 1). It should be the intention of a Web 2.0 task to facilitate this development.

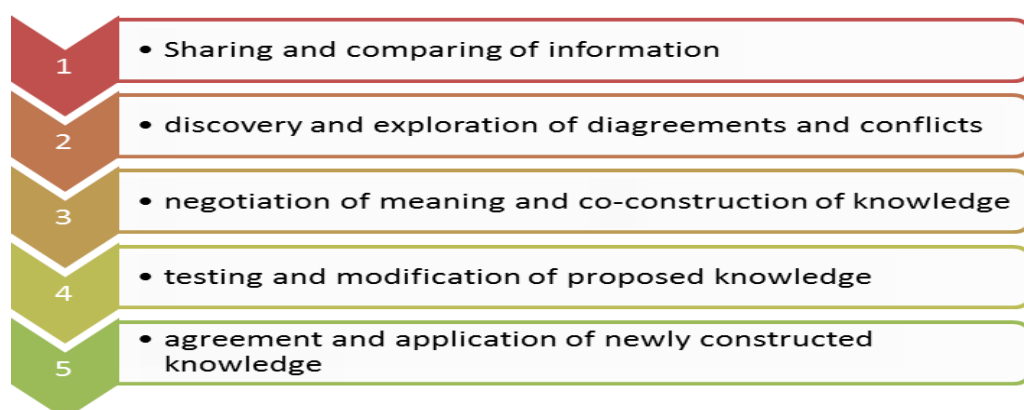


Figure 1 Mediated Knowledge Construction (Gunawardena, 1997)

Wikis in practice

Wikis and blogs are among the most used Web 2.0 services in learning activities in higher-education, with wikis in particular being used to encourage collaboration and teamwork, and to share ideas and information (Abedin 2011). Wikis are a popular choice for a tool (Karasavvidis 2010) because:

- they enable collaborative creation of website content
- they are readily available with no hardware/software dependencies
- they are easy to use
- they provide management facilities such as tracking changes

Their effectiveness though has been mixed; Paulus (2007) described the general trend on computer-mediated communications as bearing "disappointing results" often not progressing beyond phase 1 of Gunawardena's model. Cheng & Chau (2011) found that empirical evidence about the use of wikis as a collaborative tool is inconclusive.

Some case studies into the use of Wikis in the literature reveal :

Literature - Case Study 1

Grant (2007) conducted a case study of a Wiki project in a UK secondary school on students aged 13-14 and divided into groups of between six and nine. Training was supplied on the technical aspects of using a wiki, but the students' were deliberately allowed to organise their own collaboration and use of the wiki. Grant concluded that instead of collaborative learning and knowledge creation taking place, there was:

- a strong assertion of content ownership
- a reluctance to edit others' work
- a failure to see the ability to edit others' work as useful or desirable
- little evidence of a knowledge building network

Grant found no evidence of the social and cultural practices of collaborative working. For students to care about the overall product and not just their own contribution they should have perceived the whole exercise to be an "authentic, relevant and worthwhile" one. However as they thought they were being individually assessed on their work by their teacher, they did not appear perceive the exercise in this light.

It can be argued that the students' youth and inexperience in collaboration could result in a lack of knowledge or confidence in editing others' work – even though the technology was available for them to do so.

Literature - Case Study 2

Karasavvidis (2010) conducted a case study in to uses of Wikis in higher education and found that although the wiki task was designed and intended to elicit collaboration, the students did not collaborate on knowledge creation but cooperated on artefact creation instead.

The students complained that:

- the task took too much time and effort compared with other assignments
- copy and paste strategies emerged
- the opportunities for communication were limited and not used
- competition between students undermined collaboration
- there was reluctance to edit the work of other students.

Karasavvidis concluded that the user participation which creates the constructivist value of group-work using wikis cannot be taken for granted. It represented a new way of working for the students which they did not find comfortable - in particular they were not used to a sense of shared ownership and responsibility for the task presented.

Literature - Case Study 3

Huang and Nakazawa (2010) conducted a 10 week Masters level course in which the students were divided into small groups of 3 or 4 and were required, over the

duration of the course. To collaboratively construct a Wiki that covered the course content. The researchers found that the motivation to develop the Wiki declined over the duration of the course. Both the number of new entries and the number of reviews/revisions dropped, suggesting that the instructors need to "purposefully encourage and sustain" the activities of the learners.

Computer criticism

Seymour Papert, the inventor of "Logo", in response to claims that the programming language was not helping students learn and understand geometry claimed that "the context for human development is always a culture, never an isolated technology" (Papert 1987). By asking a similar question, "Do hammers and saws make good furniture?" he demonstrated the problems inherent in trying to judge a technology in isolation from the human aspect of using the tool - the effectiveness of the tool often depends how the tool is used more than the qualities of the tool itself. This is reminiscent of the lesson of the dot.com crash of 2000.

It is therefore prudent to examine the human context in which Wikis are used before reaching a conclusion as to their effectiveness.

Communication

The primary medium used to communicate in Wikis is written text used asynchronously. Asynchronous communications mean that the writing of a message and the subsequent reading are not connected in real time. This is unlike speech where the message is received a determinable (usually very short) time after it is spoken.

Such a mode has drawbacks: conversations may be lengthy and time-consuming to read, and are generally conducted more slowly perhaps involving hours or days of "lag time" between messages which might make it difficult for participants to remain engaged (Paulus 2007). In a multi-participant situation, learners may join in the conversation at different times, further adding to delays and confusion (Wang & Woo, 2007). It might also make it difficult for the task to be completed on time. In the case studies reviewed, the learners were unfamiliar with the wiki technology

and therefore used other means to organise their work. Email and face-to-face conversations were popular choices.

However, written communications do have some advantages over face-to-face communications (Wang & Woo 2007). Because the process is written and slower, they do facilitate responses that are more reflective and considered, and this can lead to more critical thinking which enhances constructive learning. Furthermore, people who are more introverted or have language difficulties may find Wikis are more comfortable environment in which to participate.

In terms of social-constructivism, the nature of communication itself should develop. Salmon (2002) (Figure 2) shows a five-stage framework in which initial communications based on introducing and organising the task should develop into sharing information about the topic - thereby sharing information and co-constructing knowledge. None of the case studies reviewed demonstrated this development occurring. However, this might be due to the short-term nature of a wiki project where participants don't have the time necessary to establish a social environment for working.

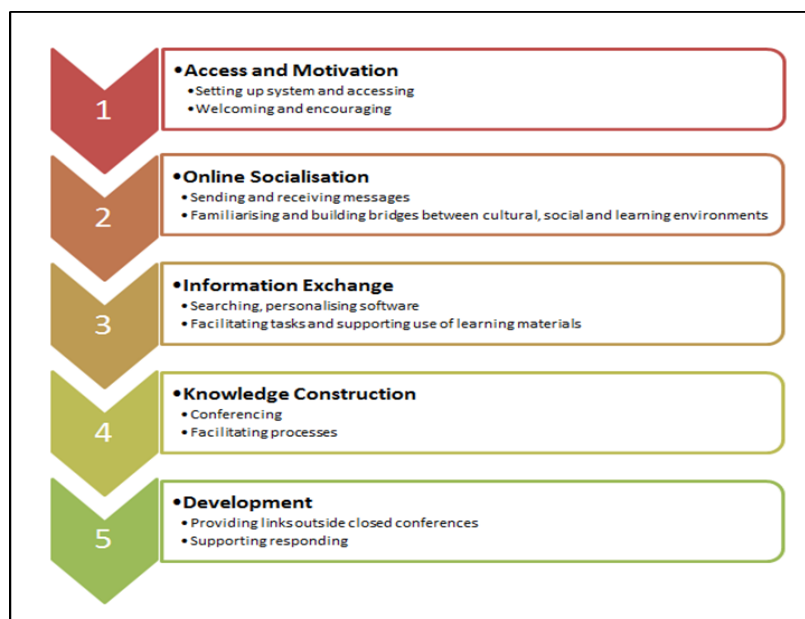


Figure 2. Model of teaching and learning online through online networking (based on Salmon 2002, p11)

Working in Groups

When using Wikis for group-work in learning activities, there appears to be an assumption that *social groups* which form through social networking sites such as Facebook and have been very successful, and *learning groups* which are set up in the class, will produce the same level of communication and collaboration among their participants.

This does not appear to be the case. Social groups emerge and evolve over time - people join and contribute to social groups voluntarily because they want to - there is an intrinsic motivation to participate. Learning groups in contrast are artificially constructed by the teacher and the motivation of student is extrinsic - it needs to be created and developed.

The difference between social groups and learning groups is reflected in the "blurring line" between formal learning and informal learning. The social groups, their conversations, and the information exchanged and subsequent learning is informal and unstructured (Lim et al, 2010). In other words, in an informal learning situation the learning outcomes are largely unspecified and emergent. This is not a desirable situation for higher education, where learning outcomes are specified and communicated early in the learning activity. The nature of the conversations in a formal learning situation therefore needs to be different.

Walker & McPherson (2007) claim that it cannot be assumed that learners will automatically engage in Web 2.0 conversations, nor that any conversations will be productive in terms of learning. They note that three aspects of computer-mediated communication (CMC) are necessary for discussions to take place that are at the higher levels of the Salmon framework. These are

- **management** - controlling the discussion, making sure that it stays on topic, that participants all share in the workload, that potentially disruptive activities (such as dominating the conversation) are discouraged.
- **community building** - making sure that participants are welcome and feel able to contribute in a safe discussion where their contributions are respectfully received

- **argumentation** - these skills allow and encourage the topic to be critically explored and analysed. They include challenging viewpoints and requesting justification, requesting clarification and developing counter-arguments or opposing opinions.

Where these three aspects are not developed, the situation can be impaired. The sense of an authentic team task may be lacking which leads to the separation of the task where each learner concentrates on their own assigned sub-task.

Furthermore, if the learners in the group are not familiar with each other and do not make the effort to build a community, then this may provide a reason why learners seem unwilling to edit other learners' contributions, preferring to adopt a non-confrontational role and focussing on their own portion of the task.

Building a team and developing a group-working culture requires effort. Jacques & Salmon (2007) describe a range of activities needed to develop this "positive group culture" as including:

- Understanding group dynamics and using them to create a climate that is welcoming, supportive and inclusive.
- Making sure people know each other
- Making sure everyone will benefit from being in the group and that individual needs are met.
- Using the varied skills of team members where they can deliver their best effect
- Creating an atmosphere where people are confident to contribute, that they are encouraged and supported to do so, and counterproductive behaviours are discouraged.
- Having a meeting that is fun and enjoyable.
- Allowing non-productive members to leave the group gracefully.

However, these kind of group-building activities appear to be absent in the Wiki studies examined.

There are two possible reasons for this:

- (1) The group was not clear on the goal, or lacked a collective commitment to the goal. This impedes group formation. (Paulus 2007)
- (2) Text based communications lack the non-verbal communication that is present in a face-to-face conversation. Emoticons and abbreviations (such as LOL) are used as substitutes but these are not necessarily as effective in creating the rapport needed to build a friendly working relationship. (Walker & McPherson 2007), (Wang & Woo 2007).

Using Web 2.0 technologies alone is not sufficient to create a successful eLearning environment (Lim et al 2010). The formation and development of a group in a formal learning situation should be a deliberate processes, not an informal one.

Hazari et al (2009) state that group formation can raise several questions:

- How to select groups? (by last name, randomly, self-selection, by learning styles, etc)
- How to manage teams with different backgrounds or cultures?
- How to foster teamwork?
- If and how to assign students their roles in the group?

This is not a trivial exercise. Social groups form and emerge naturally with ease. Formal learning groups require management that cannot be taken for granted.

Personal Experiences

The author has used wikis as a student on several occasions, on courses in education at the University of Leeds and at the University of Hertfordshire, where I found the experiences match those described in the literature.

In all cases, the intention was to create a collaborative work, but there was very little communication between participants other than to organise "who does what". This led to the wikis being a congregation of disjoint pieces of work, with little cohesion to the group thinking or the resulting text.

In one instance, an "editor" role was assigned to one member of the group, and their task was to review the proposed text and rewrite parts where necessary to ensure a consistent flow, structure and style to the text. This was achieved but, being done by one person alone, cannot be conceived as group-work in any form.

Neither I, nor colleagues with whom I discussed the work afterwards, felt that any group working benefit had been achieved - the wiki was simply a task to be done. It stimulated cooperation (sometimes reluctantly and resentfully) rather than collaboration, and certainly did not produce socially-constructivist learning.

Conclusions

Wikis are a tool that can be used for collaborative creation of knowledge. This can be exploited in an educational context, but the learning activities need to take account of group formation processes.

The spontaneous emergence of cohesive groups such as the social groups in Facebook cannot be expected to occur among people that are unfamiliar with each other and do not normally communicate at a social level - formal groups need to be established and developed in accordance with the models of group processes.

The learning tasks need to be explicitly designed to assist community building within the group so that it can develop. This may include communication other than via the wiki so that rapport is developed and the group can organise itself in a time-efficient manner.

The Wiki is a tool that can be used to support collaborative and constructive learning, but it cannot by itself ensure that these will take place. As with most tools, including other Web 2.0 ones, how the tool is used and exploited is a critical factor in its success or otherwise.

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