

**Wikis as an efficient means of student collaboration in
completing coursework**

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Abstract

Much of the power of wikis lies in their ability to stretch knowledge-sharing beyond the classroom. However, the instructor typically remains as an authority figure within the wiki space. In this research, the voice of the educator was silenced with responsibility for organising and running of wikis given to students as part of their assessment work. A wiki should offer time-poor students an efficient online means of collaborating on assessments. This research assesses the extent to which such efficiency can be achieved.

Student groups in a part-time undergraduate cloud computing module used cloud-based wikis to collaborate on coursework. The wikis functioned as discussion boards and a means of evolving the required coursework report document. Each of the 10 groups of between two and three members each, organised themselves in terms of how they structured and managed their group wiki. Marks were allocated for regular adding and editing of content, displaying evidence of this content evolving appropriately over time. Each student completed a one-page report detailing their personal experience of using the wiki.

While all students successfully completed the coursework, the efficiency with which this was achieved varied. Some students found the wiki to be an excellent means of structuring and progressing their report with the wiki facilitating discussion and managing on-going documentation. Others had operational issues that impeded this success. For example, one group member accidentally over-wrote another member's content without enabling the roll-back feature of the wiki. Few students considered the wiki to be a poor substitute for face-to-face discussion.

In conclusion, wikis can be an efficient means for students to collaborate and complete their coursework. However, instructors need to scaffold and teach students how to use the wiki to avoid negative operational issues, suggesting that the active voice of the instructor is needed when preparing students for wiki-based assignment work.

Keywords

Wiki, collaboration, coursework

1. Introduction and Literature

1.1 Part-time students

Part-time adult learners are arguably the most time-limited group of the typical college population. They have multiple off-campus responsibilities that limit time for study (Lundberg, 2003). The challenge of reconciling the demands of part-time study with demands imposed by the non-study part of their lives impacts the time available for study. Part-timers are often forced to use their leisure and even family time for study (Yum, Kember, & Siaw, 2005) who add that the full-time paid employment often remains the priority with study having to be planned around it. MacCann, Fogarty & Roberts (2010) agree, citing non-cognitive constructs such as time management as more critical for learning success for part-time students than for full-time students.

The time difficulties are particularly highlighted with groupwork wherein students have to work collaboratively. Juggling personal life, work commitments, and organising around each other's conflicting schedules and time management skills (Xu, Du, & Fan, 2013) mean that time is an influencing factor on the success (or not) of the group project. Lundberg's (2003) research points to these issues being particularly problematic for part-time adult learners aged in their 20s. The limited on-campus access to their peers / classmates had a more pronounced affect on this age group than those aged over 30.

Efficiencies are needed in how groupwork is managed and facilitated. Perhaps, technology can contribute to this. Communications technology allows part-timers to maintain some contact with their classmates that might not happen otherwise (Yum, Kember, & Siaw, 2005). Students need to be able to re-arrange their environment to affect consequent positive time management strategies employed (Xu, Du, & Fan, 2013). This research proposes wikis as a possible means of achieving this.

1.2 Wikis

1.2.1 What are Wikis?

A wiki is a web-based hypertext tool to support collaborative authoring (Shih, Tseng, & Yang, 2008). It allows learners to work remotely, asynchronously and/or

synchronously, on an idea, incrementally creating something of value. The collaboration is facilitated by allowing all members of the wiki to create and share their resources, contribute and edit content, correct errors, producing the material together (Avci & Askar, 2012). In essence, the users interact by collectively adding, removing or editing content (Mindel & Verma, 2006) with the wiki also serving as a store for these content resources.

Wikis are promising in that they actively promote student engagement on a project fitting with the constructivist approach to learning (Karasavvidis, 2010). They lend to the processes of students collectively constructing meaning and developing their required coursework reports. This use of wikis for educational purposes reflects a social, learner-based construction of knowledge (Mindel & Verma, 2006). Students have an online platform providing an opportunity to collectively take control of their work, with associated affordances that lend to optimal time management. The features of wikis are worth exploring in this regard.

1.2.2 Wiki Features

Shih, Tseng, & Yang, (2008) describe the characteristics of wikis as rapidity (a wiki can be set up and edited very quickly), simplicity (the format of a wiki page is straight-forward), convenience (links between pages and to outside websites), open source (many open source wiki products are available), maintainability (previous page versions are maintained, preserving historical content, and allowing for version management). Avci & Askar (2012) add that wikis are format-free in that they do not have to abide by restraints such as the chronological order of blogs.

The key feature for users concern collaborative affordances. Wikis facilitate students in adding, editing and deleting work, with a facility to compare current with previous versions of a document (Biasutti & El-Deghaidy, 2012). For Karasavvidis (2010) the critical collaborative features are: tracking edits, comparison between versions, roll-back to previous versions, customisable access, varying read and edit rights, integrating multimedia formats onto a wiki page, protecting pages – all of which are needed for many-to-many a/synchronous collaborations. The importance and usefulness of collaborative editing is highlighted by Kane & Fichman (2009). They cite open editing as allowing everyone to edit the same page, thereby picking up on each other's inaccuracies and improving the quality emerging. Overtime the overall

quality of the page should improve, with each edit recorded as a history page (what, who, when for each edit) that can be rolled back to if needed.

1.2.3 Wiki Downsides

Wiki implementations in higher education have largely positive evaluations. Karasavvidis (2010) quotes many success stories. However, he warns of possible downsides. Wikis represent a major epistemological shift to constructivist, active learning approaches that students accustomed to more traditional face-to-face practices might struggle with. Using a wiki is not a guarantee that students will produce content that meets their requirements (Zhang, Fang, Wei, & He, 2013).

Naismith & Pilkington (2011) quote studies providing evidence that students prefer to use what they are familiar with. For example, their students prefer to compose content using a word processor and then copy this to the wiki. They reported lack of word processing features (page layout, text formatting and WYSISYG) and lack of a familiar and intuitive interface as limits of the wiki.

The familiarity problem does not feature as directly for Cole (2008). Her respondents cited the following reasons, in order of most to least significant, for not contributing to a wiki: difficulties using the technology (navigation and browsing), competing deadlines from other coursework, work / study balance commitments (lack of time), doubts about the quality of possible contributions, and lack of interest. Expanding on this, Karasavvidis's (2010) students found the wiki to be demanding in terms of both time and effort, with the underlying problem being lack of knowledge and skills to cope with working on a wiki. It seems that time is a feature of wiki success. If a wiki is perceived as difficult to use, students might not take the required time to learn it.

Further symptoms of a less than successful wiki are the discomfort associated with having one's work edited and critiqued by peers, and not reading the contributions made by wiki team members (Karasavvidis, 2010). Members ignoring each others contributions can cause wiki contents to become fragmented, chaotic and unwieldy (Zhang, Fang, Wei, & He, 2013). The opposite is also a problem. Conflict and poor communication between wiki members can result in edit wars, delivering poorly considered edits and re-edits that risk damaging the quality of the wiki (Kane & Fichman, 2009). There is a need for cognitive reflection before contributions are

made. Wiki team members need to be cognisant of each other, avoiding superficial thinking, when working on the wiki.

It seems that wiki success is dependent on how students use and react to the wiki.

1.2.4 Student Practice

It is unsafe to assume that technology is adopted for use merely because it exists. Among the influencing factors are its perceived usefulness, user prior experience with it or a similar technology, social pressure to use it, and facilitating conditions such as lecturer support (Naismith & Pilkington, 2011). Students might not use wikis unless there is a clear reason to do so. Required skills built up through previous use might not exist. It is possible then that students in a cohort might not score well on the Naismith & Pilkington list.

Wiki members define for themselves how their processes and activity develops, often by making things up as they go along (Biasutti & El-Deghaidy, 2012). This seems rather haphazard but such exploratory approaches can result in useful content. The quality of the resulting wiki is a function of the cognitive elaboration taking place, and the mental effort collectively spent in processing wiki content (Zhang, Fang, Wei, & He, 2013). Keeping the context of the wiki in mind helps students to optimise this (Biasutti & El-Deghaidy, 2012). Their students reported favourably on being able to see changes and additions, who had made what edits, and how an individual's contribution can become part of the whole. The wiki facilitated the development process without students having to manually keep development records.

It is accepted then that wikis play an important role in providing a learning environment needed for groupwork. Within such an environment Majchrzak, Wagner, & Yates, 2006 (from Avci & Askar, 2012) suggest three user benefits from wikis: enhanced reputation, work made easier, and process improvement. How these might manifest in practice depends on the user role adopted and the dynamic emerging among the wiki team. Majchrzak et al (2006) categorised wiki users as either synthesisers (synthesised the work of other wiki members) or adders (those who contribute new knowledge) with both roles equally important and needing to be balanced across the wiki team. For example, the adders might be the reputation

boosters, while the synthesisers might contribute more to simplifying work requirements.

2. Methodology

In order to ascertain whether wikis can achieve time-saving efficiencies for part-time students completing groupwork, the following methodological decisions were made.

Sample: Respondents were enrolled in a part-time undergraduate cloud computing module in the second year of a BA Hons in Information Systems. They used cloud-based wikis to collaborate on group coursework. There were 22 students in 10 groups with between 2 and 3 students per group. Students were aged from mid-20s to mid-50s, and most were working in some aspect of business computing. Prior to the study, there was some familiarity with wiki technology even if students had not experienced using them.

Context: The coursework was part of the mandatory assessment for the module. Students were required to research, recommend and justify cloud computing solutions for a given semi-fictitious case organisation. This involved carrying out requirements analysis and matching appropriate cloud computing vendor(s) product offerings to the requirements. Students used the web-based Wikispaces (each group had its own wiki) instead of more traditional collaboration means. The lecturer (researcher on this paper) allowed the students to self-organise in setting up the wiki, manage it on an on-going basis, and progress at their own pace. There were no interventions except to answer queries and clarify aspects when asked.

Role of the Wiki: Wikispaces was chosen for a number of reasons: being open-source self-hosting was not required, it was reasonably customisable, and the researcher was familiar with it. It functioned as an online meeting space for the groups and a means of evolving the required coursework report.

Data generation: Each student completed a one-page report detailing their personal experience of using the wiki. This was in lieu of survey methods such as a questionnaire so as not to bias or pre-empt any issues. The content was at the discretion of the students. They decided on which topics to include and omit. The lecturer emphasised that the aim of this report was not to measure the quality of the

wiki per se. Rather the focus was the students’ perception of it as a means of more efficiently producing their coursework.

Data Analysis: This involved sentiment analysis of the students’ self-reports. These reports were completed by all students individually, even though students worked in groups. It is possible for members of a wiki team to have varying perceptions of the wiki experience (Zhang, Fang, Wei, & He, 2013).

Sentiment concerns emotions and opinions (Kadam & Joglekar, 2013). The analysis involves mining text (in this case, the student self-reports) to ascertain the Sentiment Orientation (SO) of the writer in terms of specified polarities (Wilson, Wiebe & Hoffmann, 2009) – in this case, a positive or negative perception of using a wiki to improve the efficiency of carrying out groupwork for time-poor students.

Feldman’s (2013) sentence-level structure was used, given that there were multiple views expressed about different aspects of working with the wiki within the individual student reports. As such, each report was parsed into sentiment (useful) and non-useful content. Examples of the later are comments about the case organisation given (e.g. “heavily dependent on the Apple products”). The useful content was split into sentence fragments so that only one unit of meaning carrying one sentiment is present per fragment. An example is in table 1 below.

Fragment:	Fragment broken up for Sentiment Analysis
“Being able to add and update the files that you put on the wiki as well as being able to see the work that other members of the group have done and being able to download and edit them is a great help and shows that each member of the group is contributing to the assignment equally”	<ul style="list-style-type: none"> • Being able to add the files that you put on the wiki is a great help • Being able to update the files that you put on the wiki is a great help • Being able to see the work that other members of the group have done is a great help • Being able to download and edit them [files of other members] is a great help • [Being able to see and edit the files of other members] shows that each member of the group is contributing to the assignment equally

Table 1: Example of text management for SO

The numbers of positive, negative and neutral phrases in each student document were counted. An example of each is in table 2 below. For each student a percentage of each of the three categories of their overall document was computed.

Example of a positive phrase	“can offer great benefits for people working in different geographic locations”
Example of a negative phrase	“in the case of wikispaces I can't claim that it's so easy even a child could use it!”
Example of a neutral phrase	“When I first started the Module I did not know what a wiki was or what it was used for”.

Table 2: Examples of positive / neutral / negative sentiments

In addition, a keyword analysis of the phrase sets was completed following the Sentiment Analysis. This allowed for classification of the sentiments to identify where the positive and negative sentiments lie.

3. Findings

Table 3 below shows that students displayed a mostly positive orientation to the wiki. In addition, 12 students were more positive than negative, and 9 were more negative than positive. 3 students were 100% positive, and no student was 100% negative. The highest positive percentage content was 71% for one student.

	Positive		Negative		Neutral		Total
Average per student	9	50%	6	33.33%	3	16.67%	18
Count in total	203	51.52%	126	31.98%	66	16.75%	394

Table 3: Sentiment Summary

The positive orientation was predominantly being able to collaborate online without having to meet face-to-face. Integral to this were aspects such as being able to add and update content, seeing and editing what others in the wiki team have contributed, and associated version control. The wiki space helped students assess the quality of the various contributions being made on their page, and thereby more easily focus on the project. Ubiquitous access to the wiki from any web-enabled device and the ability to customise the interface also featured prominently on the positive orientations. There were few direct mentions of time management, though all of the features mentioned have time savings and associated efficiency gains.

The negative orientations were dominated by technical issues surrounding simultaneous saving of edits, and the inability of the wiki to function as a high level word-processor. One group struggled with Wikispaces' (admittedly counter-intuitive¹) saving procedures and, having switched off version control, had work accidentally deleted. The reports of the affected member devoted much space to frustrations with

this problem. Despite being informed that a wiki is not a word processor, some students expressed disappointment at not being able to use it as such. There was much discussion on the demerits of Wikispaces in comparison to MS Word, Google Docs and other equivalents.

4. Discussion

On balance, students were more positive than negative in their views, seeing the wiki as providing efficiency gains for completing their group coursework. However the efficiency gains did not accrue equally to all students or student groups.

Most students reported favourably on many of the wiki features identified in the literature. They agreed with Shih et al (2008) in the ease of setup and version control. These features meant the project started without haste and on-going work could be managed easily. Similar to the students of Biasutti & El-Deghaidy (2012), having the document construction process made more visible was considered useful. In particular, seeing additions and edits evolve was seen positively for efficient student working. Edit wars did not feature. Mutual collaboration and document construction from a distance worked positively for most students.

The student who had his work accidentally over-written by his team-mates, while agreeing in principle with Kane & Fichman's open editing advantage, was less enthusiastic. A certain amount of sympathy must be extended to this student. Wikispaces has a complex simultaneous editing/saving sequence that the students were not explicitly aware of. Falling into its trap and its consequently negative impact on efficiency gains were outside the students' control.

Two of Majchrzak et al's (2006) three user benefits from wikis emerged. Process improvements and work made easier emerged as positives in the student reports. The enhanced efficiencies in managing a group project emerged with the project seeming to be more manageable because of the wiki. Reputational endorsement was not a feature.

Given that using wikis to complete their coursework was novel for the students, it was inevitable that they compared it with methods they were more familiar with. In agreement with Naismith & Pilkington (2011) the word processor was an oft-mentioned alternative. Students had been informed that, while the wiki has word

processing facilities, it lacks the features and strength of established word processing programs such as MS Word. Though understandable from an efficiency viewpoint, some students wanted to use the wiki as a word processor, not seeing the value in having to use two software applications for the same report. Inevitably there were formatting clashes that took time to clear, negating some of the efficiency gains. Some students preferred Dropbox in that it is mapped to a drive on their computer, making for easier file upload and download than Wikispaces. However, it doesn't have the history records of who edited what and the option to roll back to previous versions. It is possible that the value of such records is not rated highly by some students, preferring to make efficiency gains though exploiting familiarity instead. Google Drive has an easy-to-use and familiarity advantage, allows simultaneous editing and roll-back to previous versions, and thereby might be a viable alternative to a wiki.

Collaborating-in-the-cloud was a topic completed on the module, meaning that students were aware of how wikis worked and had seen demonstrations of wikis prior to working on their own wiki. Being Information Systems students it was reasonably assumed by the researcher that they would not have difficulties with the technical aspects of the wiki. Most students reported favourably in this regard. Technical issues were not as prominent as reported by Cole (2008), though there were saving and navigation problems for some students, temporarily impeding their progress.

5. Conclusions and Future Work

Wikis are a means of improving the efficiency of collaborative working for part-time students but are not perfect. Nonetheless, with some interventions by the lecturers, some process aspects can be improved. There is a need to understand from the student perspective what using a wiki means to students. The instructor needs to know whether and how they perceive it as helpful to their collaborations, the process of these collaborations, and what problems they experience with it (Karasavvidis, 2010). This is all the more important given the increased emphasis on life-long learning, and corresponding growing numbers of part-time learners (HEA, 2012).

There is a need to manage student expectations and behaviour with the wiki. Setting up a wiki or telling students to do so does not automatically translate into students using it as efficiently as it can be used. There is a need to scaffold and give tuition in

using it (Cole, 2008). In this research, a pre-warning about Wikispace's complex simultaneous editing / saving might have prevented some efficiency losses.

Data may have been a possible limit in this research. While the self-reports were certainly useful, other data collection methods to triangulate the data emerging could help add value to the outputs. Though avoided in this research, a post-event survey might allow for more specific investigations and can be included in future work.

Addressing the issues identified here as much as possible, the researcher plans to run the project again. A second iteration with a new cohort on the same module extends the sample size and thereby increases the confidence that we can have in the results should the same findings emerge. It is expected that adjusting for the research implementation changes should result in more positive orientation towards the use of wikis in terms of time and related efficiency gains.

Respecting Karasavvidis (2010) view that wikis represent such a different way of working from traditional means that students need time to experiment and become familiar with them, some scaffolding will be used. To this end, the lecturer can take some class time to have students set up a sample wiki, enrol, experiment with creating and editing pages, linking, uploading content, and perform rollbacks. Explaining the technical aspects, such as how Wikispaces save multiple-user simultaneous edits, should be part of this.

Other possibilities for future work could consider how the efficiency gains might breakdown between Majchrzak et al (2006) synthesiser and adder categories. For example, what combinations of high and low skills in these categories make for optimal efficiency gains. A further possibility for future work could be an experimental approach whereby two equally matched groups work on the same project, with one face-to-face and the other using a wiki. The efficiency gains could be compared and time-saving achieved (or not) with the wiki documented.

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ⁱ Student A logs on and edits the wiki page.
Student B subsequently logs on and edits the same wiki page.
Student B saves the page and logs off
Student A subsequently saves the page and logs off
Student B logs on to discover that only the changes made by student A have been saved
Advice for simultaneous editing is to save very frequently