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## Using Wiki technology to support student engagement: Lessons from the trenches

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### ABSTRACT

This paper reports on a failed experiment to use Wiki technology to support student engagement with the subject matter of a third year undergraduate module. Using qualitative data, the findings reveal that in an educational context, social technologies such as Wiki's, are perceived differently compared with ordinary personal use and this discourages student adoption. A series of insights are then offered which help HE teachers understand the pitfalls of integrating social technologies in educational contexts.

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### 1. Introduction

Student engagement with lectures, participation in seminars and deep immersion in a subject matter has declined in recent years as the remit of UK Higher Education has changed (Barnett & Coate 2005). There is an increasing awareness that students are now entering Higher Education (HE) with a different range of backgrounds and skills sets to 'traditional' university entrants (Franklin & Van Harmelen, 2007; Oblinger & Oblinger, 2005). Widening participation drives, increased student numbers and the financial costs of Higher Education have raised concerns about the quality of student learning and experience (Haggis, 2006) which is reflected in the creation of the UK National Student Survey.

At the same time, education has been undergoing a paradigm shift moving away from teaching-as-instruction towards student-centred learning (Jonassen, 1993; Ramsden, 1992). As a consequence, curricula have been increasingly designed around learning outcomes rather than content (Lin & Hsieh, 2001). Focusing on individual learning outcomes has highlighted the role of different styles of learning (Kolb, 1984). This has necessitated Higher Education 'teachers' to review both the mode of delivery (instructive, participative, reflective, etc.) and the form of assessment given to students, e.g. individual or group.

These changes in the student population coupled with emerging trends in education have created interest in the use of Web-based technology to create flexible learning environments (Alavi, 1994). The advent of Web 2.0 technologies, collectively known as social software, present HE with the opportunity to go beyond traditional delivery formats and develop *student-centred personalised learning environments* (Sigala, 2007). Social software includes web applications such as blogs (online story-telling); wikis (collaborative content sharing and editing); social bookmarking (construction of meaning) and discussion forums (information exchange).

The differentiating factor of social software technologies is that users become *publishers* rather than merely consumers of information. That is, they are able to combine, annotate and edit existing material in such a way that new content is created and used in partnership with others. These forms of technically enabled collaboration, knowledge sharing and customisation provide educationalists with significant opportunities for creating socially engaging tasks that require active student participation and knowledge building instead of memorisation (Cych, 2006; McLoughlin & Luca, 2002; Reinhold, 2006; Sigala, 2007).

This paper will relate practitioner experiences of using a wiki to promote student engagement, defined as active participation with the class wiki to create course content, in a third year undergraduate information systems module. A review of the characteristics of wiki technology and suitable models of learning is presented. This is followed by an overview of a failed action research experiment to integrate a wiki into an existing teaching format. The paper ends by presenting a series of reflections on the suitability of educational incentives and course content design and offers some pedagogical insights for other HE teachers who are thinking of using Wiki's as part of their modules.

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## 2. Characteristics of Wiki technology

Franklin and Van Harmelen (2007) define a wiki as “a system that allows one or more people to build up a corpus of knowledge in a set of interlinked web pages, using a process of creating and editing pages” (p.5). Put simply, a wiki is an editable website that is created incrementally by visitors working collaboratively. The most famous example of a Wiki is the online encyclopaedia, Wikipedia.

Using simple HTML markup language, users are able to add and edit content via any Web browser without prior programming knowledge. To prevent undesired modifications, wikis record individual changes and keep extensive page histories. Should inaccurate or unsuitable material be posted, the wiki can then view and rollback to previous versions (Parker & Chao, 2007; Wagner & Bolloju, 2005). Content is added to particular topics with users gradually improving and extending others contributions. Through the use of hyperlinks (to and from other webpages) and posted questions (which creates new pages), the wiki thus becomes a “collaboratively expandable collection of interlinked webpages, a hypertext system for storing and modifying information” (Sigala, 2007, p. 636).

These inherent characteristics of wiki technology (incremental knowledge creation and enhancement, version management and multiuser participation) naturally lend themselves to supporting group processes and creating knowledge repositories. This has led some commentators to suggest that Wiki’s are useful tools for building communities of practice (Cunningham & Leuf, 2001; Gowin–Jones, 2003). Sigala (2007) suggests that democratic participation, connections to a broader subject matter, personal reflection and identity and the gradual evolution of material through the contributions and problem solving efforts of interested individuals help to “humanise student learning through social interaction with other students” (p. 638).

In the educational field Tonkin (2005) suggests that Wiki use falls into four broad categories:

1. *Single-user*. This allows individual students to write and edit their own thoughts and is useful for revision and monitoring changes in understanding overtime.
2. *Lab book*. This enables students to peer review notes kept online by adding, for example, commentary or annotations to existing lecture notes or seminar discussions.
3. *Collaborative writing*. This can be used by a team for joint research such as a group project, essay or presentation.
4. *Creating a topical knowledge repository for a module cohort*. Through collaborative entries students create course content that supplements and extends delivered material.

Taken together, these educational uses of Wiki’s can provide several pedagogical benefits according to Fountain (2005). These include: evolutionary knowledge building and progressive problem-solving; explaining diverse and often contradictory ideas, synoptic evaluation and definitional synthesis; critical questioning and reflection; and the ability to avoid premature judgement and engage in complex and nuanced analysis of others work.

## 3. Theories of learning

The educational use of Wiki’s will depend on a teacher’s preferred model of learning. The characteristics of Wiki technology, highlighted above, particularly suit two popular models of learning: constructivist and collaborative. Both models differ from the classic behaviourist model of learning which assumes that the goal of teaching is to efficiently transmit knowledge from the expert to the learner.

Alavi (1994) suggests that three factors are needed to promote effective learning: “active learning and knowledge construction, co-operation and teamwork in learning, and problem solving” (p.161). Both constructivist and collaborative learning models incorporate these factors but with different pedagogical emphasis.

### 3.1. Constructivist learning

A key tenet of the constructivist model of learning is that people learn best by actively constructing their own learning: students are presented with opportunities to build on prior knowledge and understanding in order to construct new knowledge and understanding. This supports the concept of autonomous independent learners currently promoted in UK education. To be successful this model requires learner-centred instruction: educational materials need to be provided that helps the student to discover things for themselves rather than via passive tuition (Lin & Hsieh, 2001).

The critical features of constructivist learning can be summarized as follows:

1. All knowledge is constructed through a process of reflective abstraction.
2. Cognitive structures within the learner facilitate the process of learning.
3. The cognitive structures in individuals are in a process of constant development.
4. If the notion of constructivist learning is accepted, then the methods of learning and teaching must agree.

O’Loughlin (1992) suggests that for knowledge construction to occur, students are encouraged to explore possibilities, invent alternative solutions, collaborate with other students (or external experts), try out ideas and hypotheses, revise their thinking, and finally present the best solution they can derive. Parker and Chao (2007), note that constructivist learning has been “approached from a variety of perspectives in wiki research, including reflective activity and communal or social constructivism” (p. 59).

### 3.2. Cooperative learning

Cooperative learning is situated within the social constructivist paradigm. Students work on projects or problems in teams with both personal and team accountability for conceptual understanding. According to Lin and Hsieh (2001), “[l]earning occurs as individuals exercise, verify, solidify, and improve their mental models through discussion and information sharing” (p. 379).

In contrast to constructivism, the key pedagogical assumptions of cooperative learning are: (i) knowledge is created as it is shared. Therefore the more students share information the more they learn; (ii) that learner's have prior knowledge they can contribute to the discussion; (iii) that participation is critical to learning and; (iv) that learners will participate if given optimal conditions (Lin & Hsieh, 2001, p.379).

Collaborative learning offers numerous benefits according to Alavi (1994). These include the ability to: (i) increase student involvement with the subject matter, (ii) enhance critical thinking skills, (iii) promote problem-solving skills amongst students and (iv) encourage student learning and achievement (Raman & Ryan, 2004). Wiki's can be used to facilitate this form of active learning where computers are used to support peer interaction and group work (Lipponen, 2002; Felder & Brent 2003). The asynchronous nature of such collaboration has been viewed as promoting cooperation rather than competition amongst students (De Pedro et al., 2006).

#### 4. Research objectives

Given the apparent synergy between the technological characteristics of Wiki technology (collaborative effort and knowledge construction) and the models of learning being actively promoted in UK Higher Education, the following question was raised: can Wiki technology be used to support student engagement? Engagement was defined as active participation in class and with the subject matter.

Whereas existing experiments with Wiki technology in educational settings has generally facilitated single-user reflections or project-based group work, this experiment sought to determine if Wiki technology could be used to create a module-level knowledge repository. That is, could a Wiki be used to create meaningful course content suitable for assessment?

#### 5. Study design

Action research was chosen as the research methodology because it is a cyclical process of reflective practice particularly suited to educational settings (Smith, 2007). Carr and Kemmis (1986) define action research as "simply a form of self-reflective enquiry undertaken by participants in social situations in order to improve the rationality and justice of their own practices, their understanding of these practices, and the situations in which the practices are carried out" (p. 162). Put simply, it is method of research focused on improving direct practice.

The basic cycle of action research involves a series of sequential steps comprising: idea conception and fact-gathering; planned change and implementation; evaluation and review resulting in modification of practice and further planned change (Lewin, 1948). Fig. 1 below demonstrates how this was applied in this experiment. First, a suitable wiki was identified that was freely available and compatible with the university's existing virtual learning environment (called u-link). Following a review of literature on student engagement and social software, the wiki was created with basic instructional scaffolding and subsequently promoted through lectures. Student engagement was informally monitored in seminar discussions and via u-link activity whilst formal data gathering techniques supported reflection – as the basis for creating future planned change.

Data was collected from a final year undergraduate module in information systems with a cohort size of 75 students. Logistically, qualitative questionnaires were administered in November 2007 (to understand student use of the wiki) and January 2008 (to understand student familiarity with social networking technologies). Group interviews were held in December 2007 with students to gain a richer understanding of student attitudes to the wiki. Participation was voluntary and responses were recorded manually by hand.

Incorporating the Wiki into the module also required several pedagogical changes prior to the start of the course. First, the delivery of the module was changed from weekly instruction and discussion to lectures and seminars occurring on alternate weeks. This was to give students sufficient time to discover new material and post to the class Wiki. Reflection on Wiki contributions would then be explored in subsequent seminar discussions. Secondly, the content of the module was reorganised to support Wiki activity. Instead of singular presentation, material was grouped into 6 thematic areas: philosophical assumptions, development techniques, ISD methodologies, Paradigm Shift, ISD implementation and future directions. This was to support knowledge discovery within defined areas and promote inter-topic synthesis and reflection. Thirdly, presentation of material now included continual support for Wiki use. For example, lectures included slides that helped students consider issues on the Wiki and offered pointers to further reading sources whilst seminars included Wiki-based reflective activities. Finally, the assessment structure was modified to encourage student participation with the Wiki. Assessed solely by an end of year exam, students were told that material posted to the Wiki would be used to create one exam question; i.e., students would have the freedom, and responsibility, to determine a quarter of their assessment.

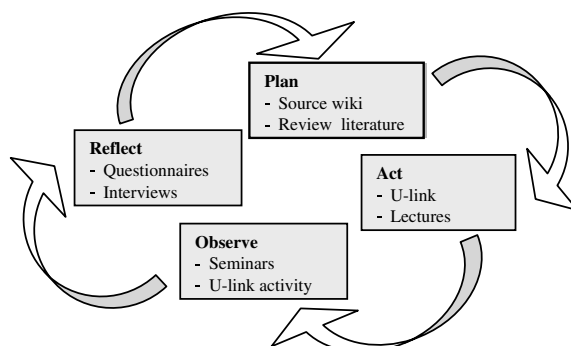


Fig. 1. The Action Research Cycle for Monitoring Wiki Engagement. This presents a cyclical diagram detailing the research actions taken to monitor wiki engagement.

## 6. Findings

After 5 weeks (halfway through the teaching term) there had been zero posts to the wiki. Whilst student attendance at seminars consistently averaged about 50% of the total cohort, students were only interested in participating with the pre-set learning activities. An open-ended questionnaire was administered to determine whether the lack of Wiki use was simply student disinterest in the technology or reflected broader concerns about posting material (see Table 1).

Out of 51 responses (68% of the cohort) two thirds had visited the wiki but zero had posted anything. The reasons ranged from academic pressure from other courses (educational constraint) to ease of use concerns (technical constraint) to issues of self-confidence (personal constraint) and a finally a total lack of interest. As can be seen from Table 2 below, nearly a quarter of respondents (37%) cited difficulties with using the technology as the reason for not posting anything to the Wiki. Nearly a third of respondents (29%) noted that coursework deadlines from other modules were preventing them from making Wiki posts. Interestingly, 14% of respondents highlighted doubts about the quality of their contributions as the reason for not making any Wiki posts. The remaining 20% of respondents were simply not interested in posting to the Wiki.

Volunteer group interviews were then held to get a richer understanding of student attitude relative to the class Wiki. The findings were related and the students were asked to give their opinions as interim feedback. Regarding technical problems, students generally commented that the Wiki's "navigation and browsing aren't the easiest of tools" and that "there aren't any useful guidelines or tips that could be used." One student noted that "I did try posting once but it would not let me upload it". There was an interesting debate between students in one of the seminar groups regarding academic pressures.

In response to the most frequently cited comments of "lack of time due to other commitments" students made the distinction between demands of work and study. For example one student commented, "if I'm not at uni [sic] then I'm working at Tesco's and if they need you to change shifts or give you extra shifts then you've just gotta take it. "In contrast, other students noted that "you can always find time to do the stuff you are interested in" and suggested that "you can find loads of people playing pool but not studying". A frequent opinion expressed however, was general coursework pressures. One student recounted that he had "a piece of coursework to submit every week for the last 4 weeks" whilst others noted that "sometimes the deadline for two major coursework's are on the same day or really close to each other".

Student's response to the issue of self-confidence was divided. Some stated that they "don't want to be the first to post" or simply "wanted to edit another students wiki posts". Other students were under-confident about their work stating "I haven't done all the reading for the module so I'm not in a position to post informed answers to the wiki." For those students that expressed no interest the general comment was "I can't see any value in it" although one student did mention they would "probably use it closer to the exam".

A second questionnaire sought to place these findings within the broader context of human behaviour and social networking technologies. Of particular interest was determining whether students were engaged in action-oriented activities, such as uploading material or passive behaviours such as reading and browsing.

Table 3 shows that students engage in passive social networking behaviours. Over 70% of respondents have read a blog, browsed Wikipedia or watched a podcast but an even greater percentage have not written a blog, tagged an item or uploaded a video.

## 7. Discussion

The findings provide some interesting pedagogical challenges for HE teachers. The following discussion will present a series of reflections to guide other HE teachers considering Wiki technology as a teaching aid.

Reflection No. 1 "If you build it they will use it". There are several reasons why this might not be the case. First, although students possess the easy familiarity with Internet technology that characterises them as "digital natives" (Prensky, 2001), some form of instructional scaffolding is required. Even students taking a degree in Information Systems desired some guidance and tuition in using a Wiki. A second point of interest is the significant number of students that were reluctant to publish Web-based material for peer-group review. Wikipedia (2007) School and University Projects page suggests teachers provide students with classroom exercises in editing and publishing content. In this way, some of the anxiety regarding the quality of unfinished work and the nature of peer-based editing could be reduced. Finally, factors outside the control of the HE teacher may work against student use. Students prioritise their time according to the greatest perceived benefit with the result that coursework deadlines for other modules and part-time work pressures are automatically awarded a higher priority.

Reflection No. 2: Educational technology must support student needs by creating a balance between the needs of both stakeholders (lecturers and students). There must be a balance between the cost (time invested learning and using the new technology) and the benefits (engagement, interest and improved learning). Critically, this experiment highlighted the importance of managing student expectations and behaviour in relation to activities that lack a directly assessed component. It is not enough to simply add a Wiki into a course with a traditionally designed content and expect students to automatically participate. Rather, course content needs to be explicitly redesigned around Wiki use.

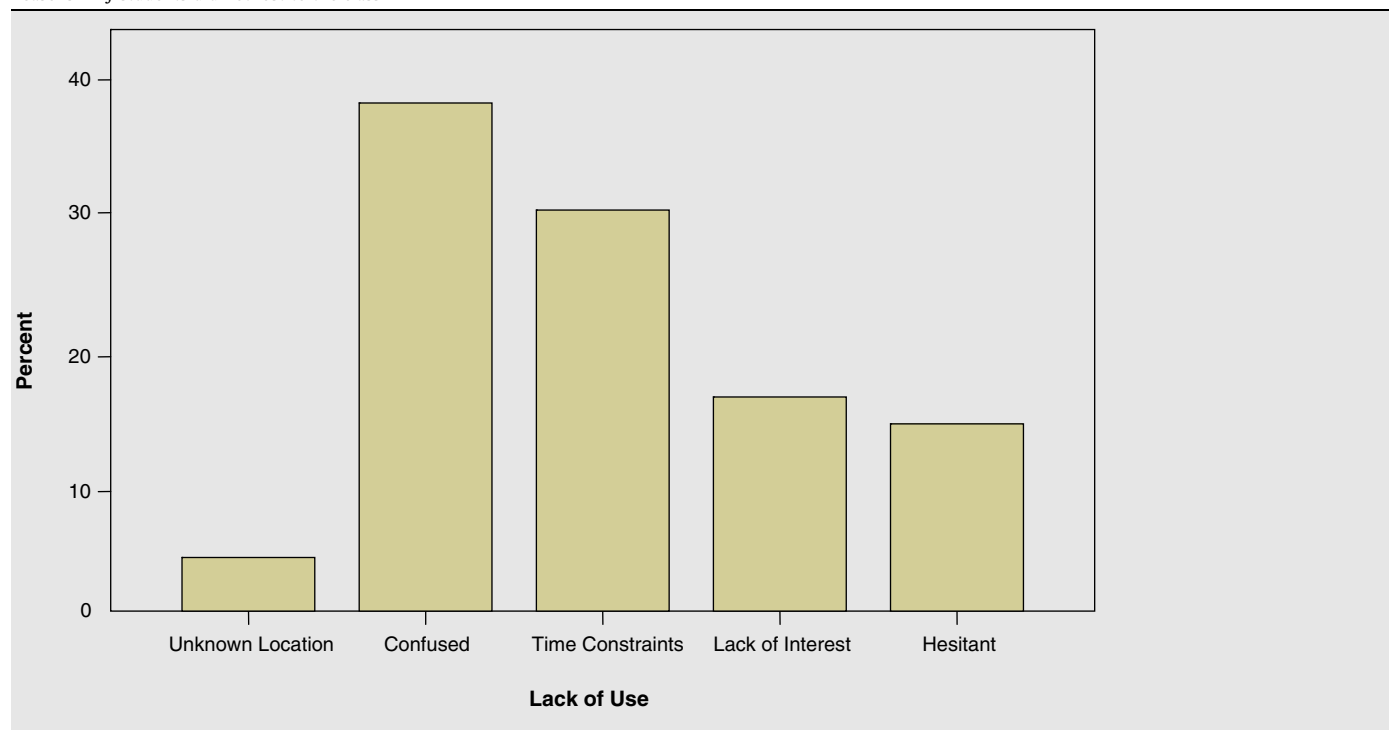
For example, a series of specially designed cascading exercises would be useful at the outset of the course. Here, students could be introduced to the different ways in which the Wiki can be used e.g. posting and annotating comments. Through this, students become comfort-

**Table 1**  
Characteristics Wiki Technology (adapted from Wagner & Bolloju, 2005)

Speed of Publication	Results reflected instantaneously on the Web server/ wiki site.
Ease of Publication	Single click publication with indexing and formatting handled by the software.
Knowledge Representation & Organisation	Topical organisation plus bidirectional indexing and chronology of changes.
Team Support	Inherently open but editable access rights can be restricted to a particular group of users although others can still view it.
Version Management	Versions and history of changes are provided with facilities for rollback.

This presents a two column table identifying 5 key characteristics of Wiki technology with associated description.

**Table 2**  
Reasons why students did not use the class Wiki



This is a bar chart showing the frequency rates and reasons why students didn't use the wiki.

**Table 3**  
Student use of social networking technologies

	Yes	No
Read a Blog	72.5%	27.5%
Written a Blog	9.8%	90.2%
'Tagged' Something	37.3%	62.8%
Used an RSS Feed	21.6%	78.4%
Watched a podcast	51%	49%
Uploaded a Video	25.5%	74.5%
Posted a message	64.7%	35.3%
Used SMS / Live Chat	92.2%	7.8%
Browsed Wikipedia	86.3%	13.7%

This is a three column table showing the total percentages delineating student use of social networking technologies.

able with the Wiki as a peer-generated learning repository, e.g. citation rules and linking. Once e-learning behaviours have been established various Wiki activities are required at regular intervals throughout the course to maintain student interest. These activities could involve seminar reviews of Wiki posts to-date, a lecture designed around a particular theme emerging from the Wiki or Wiki posts of group-based seminar discussions. Ultimately, in the absence of an assessed element, students need activities that provide visible, and where possible, immediate learning benefits.

Reflection No. 3: "IT behaviour is universal". Human behaviour displayed in one information environment cannot always be transferred directly to a different information environment. The findings suggest that student motivation for using social technologies appears to be linked to their perception of fun (active postings amongst friends) and consumption (individual browsing behaviour). Consequently, there appears to be little appetite for engaging in altruistic behaviour with other students. This is particularly relevant in an educational context when Wiki contributions are perceived to benefit other students more.

Reflection No. 4: Technology needs to support a pre-existing *educational behaviour* rather than trying to import behaviour from other domains. Specifically, education exists in a consumerist culture where altruistic acts are devalued and individual effort is rewarded. Consequently, promoting wiki involvement requires some assessed element. However, this does not necessarily have to conform to the traditional mode of marking. For example, instead of assigning marks to work, students could rate Wiki contributions on the basis of frequency, quality, novelty, etc. Equally, such creative assessments do not have to be directly tied to assessments of Wiki contributions. They could relate to any aspect of individual and group work and even support the overlap between teaching and learning through annotated bibliographies, assessed group presentations that are supported by collaborative writing via the Wiki, etc.

Reflection No. 5: "Technology is fun". Fun is determined by the user and students do not appear to view popular social technologies used in an educational context as either enjoyable (fun-to-use) or intrinsically useful (fun-gained). The findings suggest that for students,



perceived usefulness is directly related to assessment structures whilst interactive learning is the activities, not necessarily the technology, that promotes the co-construction of meaning. As Cunningham and Leuf (2001) note, “Not everyone needs a wiki. Not everyone wants a wiki. Not every situation benefits from becoming an open discussion or collaboration forum.” (p. 30). Educationalists must be clear about the intended outcomes of the technology used. Curricula should be created that does not confuse technological interactivity with interactive learning.

## 8. Limitations and future research

At this stage it unclear whether Wiki's can be used to promote student engagement or create student-driven course content suitable for assessment. Had greater instructional scaffolding be provided, in the form of lab-based exercises and the creation of an accompanying instruction handout, then maybe some of those students that experienced technical difficulties, or self-confidence issues, would have posted to the class Wiki. Similarly, the perceptions of some students, who currently see little value in Wiki technology as a tool for learning, could change if class Wiki contributions had grown into a module-based repository of knowledge as originally intended. Another point to consider is the extent to which the structure of teaching and learning adopted in this experiment discouraged early student use. Perhaps some form of interim assessment or informal competition earlier in the teaching term would have provided sufficient encouragement for student involvement with the Wiki.

Social networking technologies, especially Wiki's, involve a large element of altruistic behaviour. Further work is needed to determine whether it is possible to create new pedagogic structures of learning to promote collaborative behaviours amongst students that are not directly assessable.

## 9. Conclusion

In this instance, it can be said that the Wiki had little impact on student engagement simply because the participating students chose not to post to the Wiki. However, a significant level of curiosity expressed by students suggests that the fault lay not with the technology but with an unattractive course design. It remains unknown whether students will accept Wiki technology as a means of creating examinable course content for a whole cohort. Once again, the level of curiosity expressed by students on this aspect of the experiment suggests that the conflict between the altruistic ethos underpinning Wiki use and individual assessment maybe more apparent than real.

Currently, published material relating to Wiki's used as teaching tools only seek to promote positive elements of use. The purpose of this paper, however, has been to highlight to the educational community the negative consequences experienced when the integration of a Wiki into existing teaching formats is poorly designed and supported. Moreover, this paper provides a clear example of the type and nature of student incentive and pedagogical design that resoundingly does not motivate student use of Wiki technology. Uniquely, presenting a failed case of Wiki use provides the educational community with an opportunity to learn from the mistakes of others.

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