

An Empirical Exploration of Using Wiki in an English as a Second Language Course

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Abstract

In this paper, we present an empirical study of using a new and cost-effective Web-based collaboration software, Wiki, in a freshman-level English as a second language (ESL) course. This paper explores and observes the scenario: What if the Wiki tool were to be used in an English as a second language course in Taiwan? Students who attended this study practiced English writing on a Wiki website. The data about their usage and learning achievements was collected and analyzed. Our finding of a significant, but inverse, relation between students' editing usage and academic performance challenges some idealistic hypotheses that Wiki technology is "naturally beneficial" to learning. We believe that building an instructive or constructive instructional model with Wiki in a rigorous manner requires more empirical evidence. This study provides fresh evidence that will hopefully serve as an impetus to fill that gap.

1. Introduction

Innovative Web-based social software, such as Wiki, has gradually reshaped people's understanding and exploitation of the Web. Some novel paradigms have been developed by employing the new technologies, such as authoring an encyclopedia by employing the collaborative power from the open community, namely the *Wikipedia* project [8].

"Wiki" refers to a special type of Web site that allows and encourages all users to edit and add pages within the site. The original concept was developed by Cunningham [9]. This design is considered highly democratic that encourages/facilitates user collaboration, accumulates users' opinions, and cultivates active cyber communities on the Web.

Along with this development, we observe that teachers and educational practitioners are extremely interested in applying Wiki as a collaborative learning tool for educational practices. Recent discussions in the ITFORUM electronic discussion group confirmed this observation [5]. However, the application is still in the early stages, and its validity or effectiveness remains unclear. Only a few empirical studies have been reported, such as the studies of CoWeb (a Wiki-like software) [3]. Evidently, the research effort has not been sufficient to nurture and sustain interest in the application.

In this paper, we ask the questions: What if Wiki were to be used in an English as a second language course, and what would be the impact on students?

This study faithfully reflects the scenario of students' usage behavior (e.g. browsing and editing) of the Wiki website and their learning achievements in the ESL course. The results of this study can serve as an informative reference for further development of a user/context-aware instructional design for Web-based collaborative learning.

2. Design of the Study

Our study of using Wiki in an ESL course was conducted at a public college in Taipei. The data from 43 students (26 females and 17 males) was used in the analysis. The Wiki website used was built with the SushiWiki package, a ready-to-use Wiki server with an open sourced license [6].

The Wiki platform was opened to students after the mid-term examination of this course. In association with the teacher's teaching schedule, students were required to write a passage on the Wiki website to fulfill a portion of the course requirement. The access log data of the Web server running the Wiki service

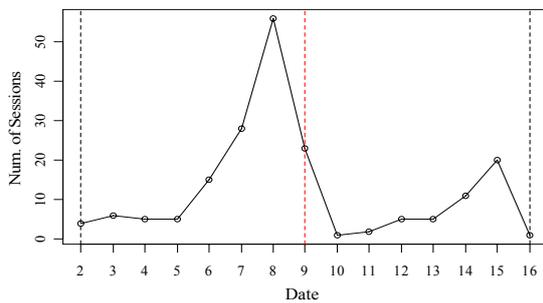


Figure 1. Time series data of the number of browsing sessions. Red dashed line (Dec. 9) represents the deadline for students' writing submissions. Black dashed lines (Dec. 2 & Dec. 16) indicate the dates of lectures in the classroom.

during the period of the study (December 2 to December 16, 2004) was incorporated into our analysis.

2.1. Learning activity

The major task during this study was an assignment of English essay writing, the title of which was: "If I were Bill Gates..." Students were given a deadline for completion of the assignment. During the two-week study, the teacher also delivered a lecture on English-Chinese translation in the classroom, using the biography of Bill Gates as an example. The teacher and other students are able to directly annotate her/his comments over any paragraphs in the website, based on the feature of "co-editing" that the Wiki paradigm specifically highlights.

2.2. Instruments for data collection

To understand the scenario of participants' usage of this website, we analyzed the Web server's access log. We use an open source Web mining tool, WUM [7], for extracting useful information from the log data. The tool helps us *clean* and *sessionize* the data, and, furthermore, enables us to identify users' behavior on the website.

In this study, we are specifically interested in students' behavior vis-a-vis page modification, namely *editing usage*, which is defined as the frequency that a student's writing on the website was edited, by themselves or others (i.e., other students or the teacher). Note that, since Wiki does not require users to explicitly logon to the system, users can create/edit web pages anonymously. Thus, some techniques and heuristics are needed to identify the ownership of writings. Instead of letting students create and name the anchors linking their pages of writing by themselves, we create and name these anchor nodes for

them. Therefore, when analyzing the data it is feasible to capture the editing usage by tracing specific anchor texts (e.g., student ID) appearing in the log file.

3. Analysis Results

3.1. Browsing behavior

A total of 187 students' browsing sessions were identified by using the WUM miner. Figure 1 depicts the scenario of the students' browsing frequency based on the date. It is clear that the browsing sessions are not evenly distributed over the period of the study. Most users accessed the website before the submission deadline for the homework (Dec. 9), as shown in Figure 1. It is also interesting that there was another access peak (Dec. 15) before a lecture the following day (Dec. 16). It is reasonable to suggest, therefore, that students' browsing behavior was *connected* to particular events on the course. This is consistent with our prior expectation about students' browsing usage.

3.2. Page editing behavior and learning achievement

We now focus on the data related to page editing usage and academic performance in order to probe the relation between users' editing usage and their academic scores. In order to probe the relation between editing usage and exam scores, we categorized the students into two usage levels: high and low. By considering the average frequency of editing usage ($M=5.95$) and the balance of the number of subjects assigned to each group for reliable statistical testing, students with a usage score greater than 5 were assigned to the *high usage group* (number of subjects=22), while the others were placed in the *low usage group* (number of subjects=21).

Students' final exam scores are considered representative for their overall performance after participating in the Wiki-based learning activity. However, since the design of this study lacks random grouping, the scenario of *possible* pre-existing differences between the two usage groups and gender groups could undermine the validity of the analysis. A two-way analysis of covariance (ANCOVA) was employed to address the issue and detect the effects of *editing usage* and *gender* on students' final exam scores with the mid-term scores as the covariate.

Before conducting ANCOVA, several assumptions of ANCOVA were tested, including the assumptions of normality, homogeneity of variance, and homogeneity

Table 1. A 2(editing usage) X 2(gender) ANCOVA of the final exam scores with the mid-term scores as the covariate.

Source	df	F	Effect size, η^2
Usage (A)	1	10.2**	0.212 [‡]
Gender (B)	1	0.01	0.003
A X B	1	0.07	0.002

**p<.005, [‡]large effect size

of within-group regression [2]. All the assumptions were confirmed, so the application of ANCOVA in this case was justified.

Table 1 presents the results of the two-way ANCOVA. It shows that gender does not have a significant effect on exam scores. Also, there is *no* statistical interaction effect between editing usage and gender. Hence, it is unlikely that gender is an influential variable.

The difference of editing usage shows a *statistically significant* effect in this analysis: $F(1,38)=10.2$, and $p=0.003$. The *effect size* metric, $\eta^2=0.212$ is very large according to a well-established criterion in behavioral science [1]. Therefore, we derive a strong support that a specific connection is likely to exist between students' editing usage and their final exam performance. With regard to the average final exam scores of the two usage groups, the high usage group's score was $M=79.91$, $SD=10.40$, while that of the low usage group was $M=86.95$, $SD=6.64$. Clearly, students with low usage performed *better* than those with high usage in the final exam.

This scenario is quite inconsistent with many researchers' preconceptions, and is therefore an interesting result. Note that this does *not* imply causality between editing usage and learning improvement, because the grouping of students was not performed *a priori*, i.e., in an experimental fashion. However, it is reasonable to view this result as an underlying collocation pattern of *high usage/low final score* and *low usage/high final score* in the learning activity.

4. Discussion

The major finding shows that it may be inappropriate to promote students' performance by *simply* using Wiki in an ESL course.

Note that this study was undertaken in a complex educational context with a short-term duration. To reflect the faithful scenario of real-world learning,

many factors inevitably remained *uncontrolled* or even *unknown*. So it is required to interpret the results cautiously. The finding of an inverse relation *does not* suggest a causal link between low (or high) usage and high (or low) scores. In other words, it does not mean that this tool is *harmful* to learning. Instead, this is a signal that awaits more insightful studies to explain *why* and to refine the way that we use Wiki in education. Nevertheless, we currently suspect that this scenario may be irrelevant to our original concerns about Wiki in ESL education. It may be that students' inherent internet usage affects their page editing behavior, so the low academic performance could be connected to their specific learning styles or aptitudes.

An empirical evaluation is important, and rigorous practice of data analysis is also of great importance. This work hopes to advance the crafts of evidence-based computer supported collaborative learning, and also, to respond to the urgent need of rigorous practices of artifact evaluation in the area of learning technology research [4].

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