

BUSINESS STUDENT COLLABORATIVE WORK SUPPORTED BY MOODLE WIKI

Viktorija Sulčič

University of Primorska, Faculty of Management Koper, Slovenia

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Abstract: The first part of the paper presents wiki as a Web 2.0 tool in general and also its potential use in the field of education. Our presentation continues with our wiki experiences, particularly how wiki, as a module of open-source learning management system Moodle, can support collaborative student work. The paper concludes with the presentation of the research results of Moodle wiki usage by business school students. Despite the fact that Moodle wiki is not as user-friendly as Media Wiki, it can successfully and efficiently support student collaborative work.

1 INTRODUCTION

After the Tim Berners-Lee World-Wide-Web revolution in the beginning of the nineties of the previous century, the Internet became more accessible to the general public. In 2004, the term Web 2.0 was created as a result of the brainstorming session between O'Reilly and MediaLive International (O'Reilly 2005). In the last three years, this phenomenon attracted a great deal of attention (Nass and Levitt 2007, 4). Furthermore, Sonesh (2005) talks about the second Internet revolution. According to Whatis.com¹, Web 2.0 is a term for advanced Internet technology and applications including blogs, wikis, RSS and social bookmarking. Greater collaboration among Internet users, content providers and enterprises is emphasized as the most significant difference between Web 1.0 and Web 2.0 (ibidem). At this point, it should be noted that the term Web 1.0 had not been used before the creation of the term Web 2.0. According to Nass and Levitt (2007, 4), the common characteristic of Web 2.0 technologies/concepts is its user centered nature. Users can easily create content, publish it on the Internet and share it with other users. Web 2.0 represents a different use of the Web, which is more collaborative and more interactive.

Web 2.0 technologies, such as blogs and wikis, are also widely adopted by businesses. Blogs and

wikis are useful for sharing of unstructured information (Whatis.com) and supporting collaborative work in working environments. Nowadays, more and more enterprises write their own blogs². Richardson (2006, 62) discusses large enterprises such as Disney³, McDonalds⁴, Sony⁵ and BMW⁶ that use wikis in order to manage documents and information. The extent of Web 2.0 technologies usage in the business world influenced our decision to implement Web 2.0 technologies in our course curriculum. It is especially important that business school students and graduates acquire knowledge and skills related to the effective use of the mentioned technologies. According to the fact (Dale 1969, 108) that learners remember more if they learn from their own experience, Web 2.0 technologies were implemented in a way that enabled students to actively use these technologies in order to prepare different tasks and assignments. We implemented the use of blogs in two postgraduate courses that are more research oriented. In these cases, students used blogs to collect different resources, to collaborate, and to develop new knowledge. For undergraduate students, Wiki was implemented as a collaborative tool in certain courses in the field of business informatics. Due to the fact that Moodle is used as the faculty official learning management system

¹ <http://whatis.techtarget.com/>
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² <http://www.asia.socialtext.net/bizblogs/index.cgi>

³ http://disney.wikia.com/wiki/Main_Page

⁴ <http://mcdonalds.wikia.com/>

⁵ http://sony.wikia.com/wiki/Main_Page

⁶ <http://www.bmwwikiwiki.com/>

(LMS), we decided to use Moodle wiki with the purpose of supporting student teamwork.

The paper discusses our implementation of Moodle wiki and its impact on teaching and learning. Moodle wiki was used in the framework of one obligatory undergraduate course and two elective undergraduate courses. Furthermore, Moodle wiki was used by students of one elective postgraduate course during the time this paper was written. The conclusion of the course is usually followed by an evaluation of the course. The evaluation questionnaire contained questions related to the use of wiki. Obtained data was then used in order to either confirm or reject the following hypotheses:

- wiki is a suitable tool for the support of student collaborative teamwork and can substitute classical teamwork performed in a classroom
- wiki usage improves collaboration among students and teachers
- the quality of student assignments increases due to the organization and transparency enabled by wiki.

Data collected by the survey was processed with SPSS program (ver. 17.0) and the results are presented in tables and figures.

2 WIKIS

2.1 Wiki Development and its Proliferation

Wiki was first used as an authoring tool used to manage unstructured data by Ward Cunningham in 1995. The word »wiki-wiki« in Hawaiian means »quick« (Richardson 2006, 59), which depicts the nature of wiki that helps us manage content quickly and easily. The most known wiki environment is free multilingual encyclopaedia Wikipedia⁷, where anyone from anywhere may contribute to its content. The negative aspect of this Wikipedia freedom is reflected in consequent scepticism, especially among professionals, regarding the reliability of Wikipedia content. Alex Halavais, professor at the University of Buffalo, tested Wikipedia by entering 13 various erroneous posts. All entered errors were fixed within a couple of hours (Richardson 2006, 61). Quick response to such attempts is one of the improved features of Wikipedia. Richardson (2006, 61) reported about a Wikipedia post regarding the Indian Ocean earthquake that struck at the end of December

⁷ <http://www.wikipedia.org/>

2004. The first Wikipedia 76-word post was created approximately 9 hours after the tragic event. In the next 24 hours, the post was edited more than 400 times and had grown to approximately 3,000 words. The photos, charts and other graphics were also edited. Forty-eight hours after the first post, the post had grown to over 6,500 words and had been edited 1,200 times. It is amazing how quickly such events appear in the Wikipedia and how quickly the content is edited, corrected or improved. Regardless, public opinion about the trustworthiness of Wikipedia has not significantly improved. Furthermore, certain sceptics do not even change their opinion despite the results of the comparison between Encyclopaedia Britannica and Wikipedia performed by the magazine Nature (Giles 2005). The comparison concentrated on 43 posts from both encyclopaedias and the results proved Wikipedia to be only slightly less accurate than the commercial Encyclopaedia Britannica.

Wikipedia is based on the fact that individuals work and collaborate, even if they do not know each other. Together they create entries that represent the best effort of the entire group, and not merely the contribution of a single person. The phenomenon was described by Surowiecki (2005) as the wisdom of crowds.

The number of posts in Wikipedia grows on a daily basis⁸. At the end of February 2009, there were 2,762,158 posts in English Wikipedia (25. 2. 2009) and by May of the same year, the number of content pages reached 2,870,805 (7. 5. 2009). Over one hundred thousand new content pages were added in mere two months and a half.

Although Wikipedia is the most recognized wiki environment, there are other interesting wikis – Wiktionary⁹, Wikiquote¹⁰, Wikibooks¹¹ etc. Some wikis, like Wikipedia, are freely accessible and anyone can contribute to its content. However, certain profit and non-profit organizations use wiki software in order to manage internal unstructured data. There are over 100 wiki software applications¹² on the market and most of them are open sourced. The most popular is MediaWiki¹³ that was developed to support free encyclopaedia Wikipedia. In addition to its public use, MediaWiki can also be used in restricted environments. For example, MediaWiki has been used by United States

⁸ <http://en.wikipedia.org/wiki/Special:Statistics>

⁹ http://en.wiktionary.org/wiki/Wiktionary:Main_Page

¹⁰ <http://meta.wikimedia.org/wiki/Wikiquote>

¹¹ http://en.wikibooks.org/wiki/Main_Page

¹² http://en.wikipedia.org/wiki/List_of_wiki_software

¹³ <http://en.wikipedia.org/wiki/MediaWiki>

Intelligence Community (IC) since 2006. Intellipedia¹⁴, as they named their wiki, is not freely accessible and is used by IC analysts, working groups and engineers to collaborate and share unstructured data¹⁵. According to the IC report, »Intellipedia provides a cost-effective platform to access expertise whenever it resides across the IC«¹⁶.

2.2 Wiki in Education

In the previous chapter, we mentioned comparisons performed between free and commercial encyclopaedias. The comparison displayed that Wikipedia is slightly less accurate than Encyclopaedia Britannica. Although it has been proven that the reliability of Wikipedia data is not as low as presumed, teachers at all levels of education warn students not to use Wikipedia's data as the primary source for their assignments and projects. Wikipedia's data may be used only as a starting point and complemented by other more reliable sources of information – school textbooks, books, journals and other printed or internet sources. The new challenge dealing with the use of Wikipedia in education rose from this doubt in the reliability of information provided by Wikipedia. Students may test Wikipedia data about a topic they are studying in class with the use of other sources and consequently improve or correct the Wikipedia content if they find any errors or deficiencies as a part of their homework. They can work either individually or in small groups. Furthermore, students may post results of their researches in the Wikipedia. With the usage of wikis, students learn how to publish the content and how to develop and use collaborative skills, they learn to negotiate with others in order to agree on correctness, meaning and relevance (Richardson 2006, 65).

Since wikis are easily accessible and all information and data can easily be managed and quickly updated, wikis may also be used as school textbooks. This idea was realised by the California Open Source Textbook Project (COSTP)¹⁷. The aim of the COSTP project is to employ the advantages of open source content and innovative licensing tools to reduce California's K-12 textbook costs, to increase their content and to avoid the shortages of K-12

textbooks. Some of the freely accessible textbooks from Wikibooks¹⁸ can also be used in either real or web based classrooms. Free access to a wide range of textbooks is especially important for less developed countries where there is a lack of financial resources to prepare quality school textbooks. However, the textbook language may cause a serious obstacle in non-English speaking countries.

Introducing wikis in the learning process is an opportunity to introduce students to the concepts of open source software, community collaboration, respect for other people's ideas, intellectual property etc. (Richardson 2006, 67).

Teacher may use wikis to take group lecture notes, support group project management, perform brainstorming, prepare content that will later be published in others wikis, such as Wikipedia, and support collaborative work between teachers and employees (Cole and Foster 2007, 165-166).

In continuation, the use of wiki, as a tool to support collaborative student work, is presented.

3 COLLABORATIVE WORK WITH MOODLE WIKI

3.1 Student Collaborative Work

We have been using Moodle at our faculty from the moment we decided to implement e-learning, namely since the academic year of 2003/2004. We started to experiment with Moodle in the framework of the undergraduate course of e-business. E-learning is a type of e-business; therefore, the e-business course was the most appropriate course to be performed online. Students would thus learn the course topics through their own experiences using the Internet technologies. The Internet technologies were used even before Moodle has been selected as the faculty's learning platform. During the e-business course, students prepare different group assignments, which are individually graded and then together compose the final course grade. Students may work in groups in different ways. They may prepare their group assignments working together in the classical classrooms or they divide the assignments among the members and then complete the assignments at home. In the latter case, the group leader combines the completed individual assignments. Irrespective of the way the students accomplish their group assignments two main pro-

¹⁴ <http://en.wikipedia.org/wiki/Intellipedia>

¹⁵ <https://www.cia.gov/news-information/featured-story-archive/2008-featured-story-archive/intellipedia-marks-second-anniversary.html>

¹⁶ <https://www.cia.gov/news-information/featured-story-archive/2008-featured-story-archive/intellipedia-marks-second-anniversary.html>

¹⁷ <http://www.opensourcetext.org/index.htm>

¹⁸ http://en.wikibooks.org/wiki/Main_Page

blems are presented:

- the inactive students can easily be hidden by active students who work instead of them. Active students usually do not like to report the inactivity of their colleagues.
- submission of group assignments via e-mail often causes problems – students stated that the assignments were mailed in time; however, the teacher did not receive them in time.

Due to the above stated problems, we were looking for different ways of supporting group work. By introducing Moodle in the learning process, new opportunities for the support of group work were created. The students accomplished their assignments through discussion in the Moodle Forum; forum discussions were divided according to the created groups. The group discussions may be seen only by group members and by the teacher. At the end of the week, the group leader wrote a discussion summary and submitted it in the Moodle activity Assignment. The teacher assessed the discussion summary and only the students that were involved in the forum discussion were rewarded with points, which would add to their final grade. In this way, we eliminated the possibility that inactive students would be awarded undeserved points. Sometimes, the group successfulness depends on how the group leader is able to write the summary. Since only the summary is assessed, it may occur that the student may be assessed better if the partial discussion would also be assessed. The discussion in forums was monitored by a teacher who could, if necessary, propose students to discuss a different perspective or change the discussion in case they were not on the right track. The students appreciated the teacher’s involvement in student discussions. In case the group discussions were very intense, the group leader found it difficult to join the discussion posts into a relevant summary that was assessed by the teacher. Furthermore, tracing numerous student discussions at courses with a large number of students was fairly difficult for the teacher as well. Therefore, it became necessary to find a new way of supporting student group work. In 2007/2008, when Moodle 1.6.5 was used, we decided to use the wiki activity for this purpose. Moodle wiki in version 1.6.5 had a problem when two or more students edited a single wiki page at the same time. Namely, only the changes of the student who first saved the edited wiki page were recorded. Changes made by other students – wiki authors, were lost. The problem was serious, because students were not notified that another user is already editing a particular page. The error has been corrected with

the introduction of a new Moodle version. In 2008/2009, we started using the Moodle version 1.9.4 that was upgraded with user lock announcement.

The feature of simultaneous multi-user editing, as it occurs in GoogleDocs, is not possible in Moodle wiki so far and it presents the main obstacle for wider use of wiki among Moodle users.

3.2 Introducing Moodle Wiki in a Business School

Moodle wiki was first introduced in the course of e-business in 2007/2008. During the course development, the guidelines for the creation of student papers were prepared. The guidelines contain several screen shots about wiki page editing with emphasis on the wiki syntax. Furthermore, the screen cast about wiki editing was recorded. During the first face-to-face meeting, wiki usage was presented by the teacher. However, in the next academic year the mentioned face-to-face meeting was not performed in some courses, because we wanted to encourage the students to learn how to use wiki by themselves. Students learn how to use Moodle wiki from paper-based guidelines and from screen cast, both available in the Moodle course.

Moodle wiki was implemented in three undergraduate courses – Business informatics, E-business, E-learning and also in the course Management of e-learning, which was carried out for the postgraduate students. In the E-business course, Moodle wiki was used to support all student group activities, while in other courses Moodle wiki was used only for the first activity where students presented themselves. In all cases, the first Moodle wiki page was prepared by the teacher (Figure 1).

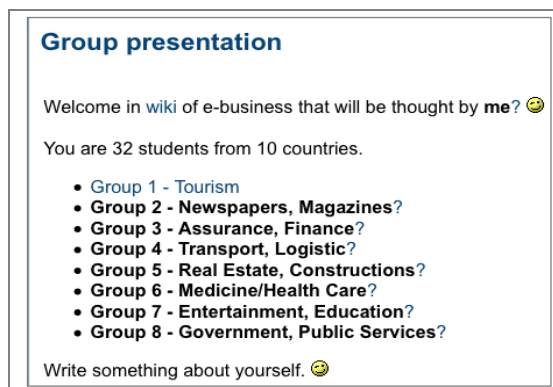


Figure 1: The Moodle wiki first page.

In this way, the students could easily edit their

first Moodle wiki page by clicking on the question mark and thus became more comfortable with wiki editing. The mentioned guidelines and screen cast helped them improve their first wiki pages in the following days. Figure 2 displays that Group 1 has already composed their first wiki page, while the other groups have not yet started editing (question mark next to the group name).

Students usually do not have any problems with editing the wiki pages, because the editing process and the toolbar are similar to editing and toolbar in the most commonly used word processors (Figure 2). The wiki text can easily be formatted, external URL may be added, and different wiki pages can also be easily connected. The new wiki pages can be created (and connected) by putting words between square brackets ([]). When the target wiki page name is not the same as the link word displayed on the source wiki page, the vertical bar (|) is used to separate text and the name of the target wiki page¹⁹ (Figure 2).

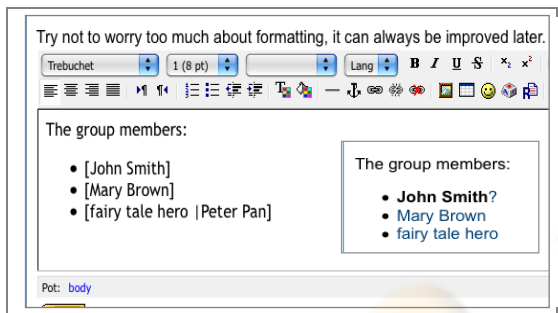


Figure 2: Moodle wiki in edit mode.

Students who are skilled in HTML language can also edit wiki pages in HTML code. Furthermore, students can compose wiki content in different HTML editors and then copy the content to the wiki editing window in Moodle.

3.3 Group Work in Moodle Wiki

According to the E-business course curriculum, it is expected that students prepare six different group assignments. The course in Moodle is designed to be performed in separate groups. This means that the entire group work can be followed only by group members and the teacher/tutor. The wiki activity is performed in separate groups as well. Group separation helps the teacher to focus easily on the particular group activity and also on the activity of

¹⁹ The text “fairy tale hero“ contains the link to the wiki page named “Peter Pan”.

each group member. The teacher prepares the wiki front page that contains the basic guidelines for each assignment (Figure 3). Detailed guidelines for each assignment were delivered to students through Moodle during each week.

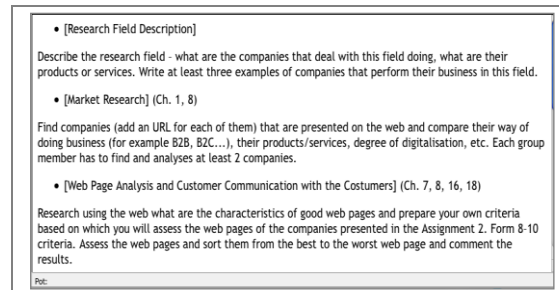


Figure 3: Wiki front page.

Students were encouraged to write some draft notes about their assignment at the beginning of the week. They could also write notes about the planned group assignment progress – member tasks and due dates. Any group member could add and correct the wiki content at any time from anywhere. This wiki feature was accepted really well by the students. Furthermore, the teacher was able to review all these notes and consequently intervene if the assignment did not progress according to the study guidelines. The wiki *History* view enables the teacher to view the entire history of a particular wiki page – who edited what and when. Student participation in wiki activity could also be monitored through *Report* feature. Using *History* and *Reports* helps teacher separate active students from inactive students and award points only to those students who really contributed to the group assignment work.

- Despite all mentioned wiki advantages, the wiki in Moodle 1.9.4 still has some disadvantages:
- it is still not possible for two or more students to edit a particular wiki page at the same time
- wiki student activities cannot be assessed within wiki. The Assignment–off-line activity was used to record the points students gained with their wiki activity.

3.4 The Student Opinion

In the last week of each course performed online, students are invited to fulfil the survey about the course. For the students of the elective course (Table 1), a group of questions about the use of wiki, as presented in chapter 3.2, was included in the survey.

Table 1: Students included in survey.

Academic year	Students enrolled	Survey response (in %)
2007/2008	56	83.9
2008/2009	60	81.7

In the first year of wiki usage (Table 2), more students were not familiar with wiki (66.5%) than in the second year of its usage (40.8%).

Table 2: Wiki opinion.

	2007/2008		2008/2009	
	#	%	#	%
Prior to course enrolment, I did not know what wiki is.	31	66.5	20	40.8
Prior to course enrolment, I had a different image about wiki.	12	25.5	20	40.8
My opinion about wiki did not change after the conclusion of the course.	4	8.5	9	18.4

Table 3: Wiki suitability for the preparation and submission of assignments.

	2007/2008		2008/2009	
	#	%	#	%
Wiki makes our work easier.	31	66.0	36	73.5
Preparing the assignments in wiki is easier than it is in Word.	11	23.4	10	20.4
Preparing the assignments in Word would be easier.	5	10.6	1	2.0
I prefer to prepare an assignment in Word.			2	4.1

Wiki was the main student activity used in the e-business course to prepare the expected assignments according to the course curriculum. The majority of the students (80.9% respectively 81.6%) agreed that wiki is an appropriate activity for the e-business course (Table 4). Not a single student believed that wiki is not an appropriate activity or it is too difficult for e-business students.

Students improved their wiki assignments with different external links on topic related web pages. They also inserted different pictures and photos related to the assignment content. Inserting picture materials in wiki with the student role is not as simple as it is with the teacher role. All picture materials have to be published on the web if the student would like to insert them in a particular wiki

Table 4: Wiki appropriateness for e-business course.

	2007/2008		2008/2009	
	#	%	#	%
Wiki has to be used by the next student generations.	38	80.9	40	81.6
Wiki is an appropriate activity, but more introduction regarding its usage is necessary.	6	12.7	8	16.4
Wiki activity should only be an elective course activity.	3	6.4	2	2.0
Wiki is not an appropriate activity for the e-business course.	/	/	/	/
Wiki activity is too difficult to be used in the e-business course.	/	/	/	/

page. However, the teacher can upload desired pictures from his/her computer, while the student role does not permit the insertion of a picture or a photo from a personal computer. Some students used other wiki design features (colour, different fonts, tables etc.) in order to make their wiki pages more interesting and impressive. At the end of the course, the students were invited to assess their satisfaction with the wiki design on a 5-degree scale (5=very satisfactory, 1=not satisfactory). In the academic year 2007/2008, the students assessed the wiki design with 4.2 (SD=0.9, 95% confidence interval 4.0–4.4) and in 2008/2009 with 4.3 (SD=0.7, 95% confidence interval 4.1–4.5).

The most exposed wiki feature was the possibility of continual wiki content improvement – students were able to add, change and improve their wiki content from anywhere and at any time. Continuous teacher involvement in the learning process helped students additionally improve their wiki assignments. Students approved the wiki's simplicity as well.

The students complained regarding the picture insertion process. In the academic year 2007/2008, we received a lot of complaints concerning the multi user editing problems, where only the changes made by the student who was the first to save a particular wiki page were recorded, while changes made by other students were lost without any previous warning.

We would like to uncover the characteristics of the students who favoured the use of wiki. Therefore, a new variable from wiki suitability, were added (Table 3), wiki appropriateness for e-business course (Table 4) and student satisfaction with wiki design, was composed. With the use of correlation

analysis, we found that students who favoured wikis also favoured online study and did not have any problems with regular weekly activities. Both correlations were statistically significant.

4 CONCLUSIONS

The first positive experience from both, student and teacher perspective influenced the decision regarding the use of wiki in the elective course as a managing tool for unstructured data in the second year. Moodle wiki can be used by a very small closed group of users, which offers users (students) more privacy and more confidence in their preparation of assignments.

Based on the data analysis, we can conclude that wiki is a suitable tool for the support of student group work in an online environment and can easily replace off-line group work activity. More than 80% of the students included in the research agreed that editing wiki improved collaboration among students and also cooperation between the teacher and the students if the teacher was actively present in the online course. The teacher is able to monitor student progress in the assignment preparation process and he/she can guide the students to follow study guides more carefully and therefore improve their assignments. Using wikis to accomplish the assignments helps students prepare more quality work than they were able following the classical way.

Uncovering inactive students was approved by the students and motivated them to become more involved in the group work, since the online groups work better than do groups in a live environment.

In the next Moodle version, wiki should be improved even more. The most desired feature is the possibility that two or more users could not edit a particular wiki page at the same time. The wiki assignment ability will thus become a desired teacher feature as well.

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