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## **Why is Wikipedia so successful? Experiences in establishing the principles in Higher Education**

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**Abstract:** Wikipedia [Wikipedia06] is a well known and very successful online-encyclopaedia. It is free, available in different languages and everybody is permitted to contribute. This results in a worldwide collaboration aiming at one target: Anybody can provide information for everybody. However, one interesting question would be whether this successful principle can be transferred to learning communities in higher education and how it could be achieved. This paper presents some experiences gained during the use of a Wiki-System during lectures on structural concrete at both the University of Applied Sciences FH Joanneum and Graz University of Technology. Our approach included a technical and didactical concept as well as accepted investigation methods. Presenting a full analysis of the implementation, this paper shows its general potential, the weakness of the principle and further future approaches.

**Keywords:** higher education, civil engineering, e-learning, Wiki, online collaboration, encyclopaedic knowledge

### **1 Introduction**

“Wikipedia is an international online project which attempts to create free encyclopaedias in multiple languages. [...] Within three years, the world’s largest open content project has achieved more than 1.500.000 articles, outnumbering all other encyclopaedias.” [Voß05]. The former Nupedia project grows and grows [Nupedia06] and there appears to be no end in sight.

The intention of our project was projecting the paradigms of Wikipedia onto an e-learning setting. This leads to following research question: “Will the principles of Wikipedia work in a typical higher education learn-setting?”

Like a number of websites, a Wiki (meaning “fast” in the Haiwaan language) is an interactive system, which is driven by a special web server generating dynamic pages from the results of visitor edits [Bergin02]. The origin software (“WikiWiki”) was invented by Howard Cunningham in 1995 [Cunningham01] with the aim of creating a

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simple tool for knowledge management and effective online collaboration. Wikis accomplish this by providing users with a simple markup language and a simple mechanism to create new pages and to link them [Wang04][Elrufaie05].

On the other hand e-education or e-learning is not only characterized by the famous expression A<sup>3</sup> (anytime, anywhere and anybody) but also by the inclusion of interaction [Preece02] as a very important social element of deep and effective learning. The interaction can happen between learner and content (hypertext, simulation), learner and instructor (computer mediated communication) and finally between learner and learner (collaborative learning). Thus the fundamental idea of e-learning is supporting learners to become actively engaged in collaborative work via a computer-supported process. Mitchell [Mitchell05] reported that the interaction between learner and content and the interaction between learner and instructor must run efficiently. Gilbert & Moore [Gilbert98] suggested two-factor taxonomy of social and instructional interactivity, and on how Web tools commonly used by instructional designers match up with their taxonomy.

Also, a large number of didactical scenarios and technical tools have been developed [Collis98] [Holzinger02]. However, many projects showed lacks concerning successful interaction between the learners and an increasing learning outcome [Preece02].

Will the combination of new technologies including Wiki and the didactical concept of collaborative learning lead us to a modern kind of teaching? Will “being part of the whole development process” help motivate the students to fulfil their learning interests? Starting from the general idea of implementing such a system in two higher education lectures, this paper will outline the experiences collected with BauWiki during a three month lecture.

## 2 Design of the Study

### 2.1 Description of the lectures and technical installation

This research project took place at the Graz University of Technology and the University of Applied Sciences FH Joanneum. About 140 students of civil engineering participated in the lectures on structural concrete at both universities. A lot of experiences have been gathered in the field of using multimedia in higher education with the help of the project iVISiCE [Ebner02]. Now the use of a Wiki-system should enhance the possibilities of online learning.

Initially the free TWiki System (<http://www.twiki.org>) was installed which is one of about 200 available Wiki-systems. The most common Wiki is MediaWiki [Ebersbach05] which is used by Wikipedia.

The TWiki is a cgi-bin script written in the Practical Extraction and Report Language PERL, which reads a text file and converts it to HTML [TWiki06]. Our selection of this system is due to the numerous plug-ins available [Raygan02]. According to our opinion, it is absolutely necessary for civil engineers to insert formulae (LaTeX), tables, animations and small java applets and with the aid of the TWiki their adaptation for use on mobile devices becomes manageable. User Administration, Skins and further administration work was carried out by a student of informatics and

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since October 2005 the system has been reachable online at <http://bauwiki.tugraz.at> (Figure 1).

## 2.2 Didactical concept

The BauWiki aims to help create an online-encyclopaedia for the subject of structural concrete. The main concept was based upon Wikipedia. The students can write and edit articles concerning the lecture's content on a voluntary basis. The traditional writing, merging and collecting of relevant learning materials can be made by the whole community instead of each learner for himself. Finally the students are allowed to bring along printouts of the BauWiki to the exams. According to the principles of Wikipedia, no learner was forced to use the system. This is a very important fact concerning our hypothesis and research question.

*Only in the Original Work*

*Figure 1: Screenshot of the BauWiki*

Due to the fact that the instructors know that new technologies are often viewed very critically and that there are natural inhibitions against new things generally, the following measures were taken:

- All relevant pages were translated into German.
- Additional help-pages (goal of the Wiki, short introduction into LaTeX, the main text formatting rules) were implemented by the administrators.
- Two students (non-expert users), who had never used such a system before, tested and reviewed the help-pages. It could be seen that they felt familiar with the system within 30 minutes.
- A number of example pages were applied by the lecturers. A principal structure was given by using CamelCase links to other existing or non-existing articles.
- A 60 minute introduction was held by the lecturers at the beginning of the courses.
- After their review, the lecturers approved the article by inserting their time stamps at the end.

## 2.3 Test Setting

As a test method we used the pre/post-test experimental control group design with questionnaires [Christensen01]. In addition to the questionnaires, interviews about the experiences of selected students took place at the end of the lectures.

## 3 Results and Analysis

As mentioned above, three surveys have been carried out: a pre-test evaluating the student-related and computer-technical precognition of the students, a post-test to determine the use of the TWiki-system directly after the exam and finally an in-depth

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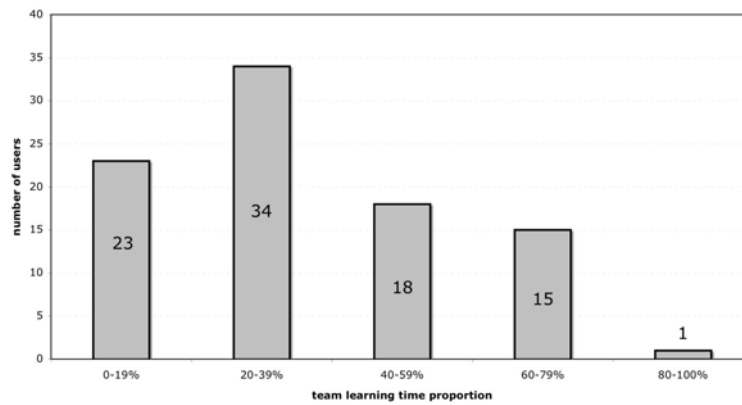
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analysis in the form of short face-to-face interviews with the participants. The total number of survey participants was 112. 18 students participated at the University of Applied Sciences FH Joanneum and 94 at Graz University of Technology. 24 students completed all surveys (table 1).

<b>overall</b>	<b>pre-test</b>	<b>post-test</b>	<b>interview</b>
112	91	77	29
<b>all tests</b>	<b>pre- &amp; post-test</b>	<b>pre-test &amp; interview</b>	<b>post-test &amp; interview</b>
24	34	0	3

*Table 1: Test-participants*

The pre-test determined the basic knowledge of Wiki-systems and the usage of computers in the student's life. It is remarkable that only 2 students contributed to other Wiki-systems (e.g. Wikipedia) while 34 used Wiki-systems only to gather encyclopaedic knowledge online. Only one of them used Wikis on a regular basis. 90% of the participants did have common experience with the internet - only 8% declared themselves to be "internet experts". While looking at the team learning time percentage as shown in figure 2 optimistically, we could expect a similar distribution for the online collaboration.



*Figure 2: How much time do you spend on team learning?*

Against this, the post-test pointed out that in the case of BauWiki almost nobody actively participated. Even though BauWiki's growth of registered users matches German Wikipedia's [WikipediaStats06] in the first months of existence (Figure 3), the number of BauWiki articles falls far short of Wikipedia (Figure 4).

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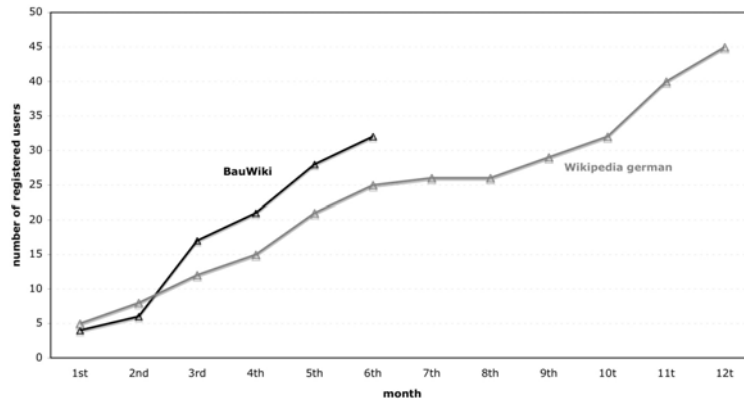


Figure 3: Growth of registered users in BauWiki and German Wikipedia.

At the beginning of German Wikipedia only a few editors created dozens of articles. The article growth was linear, which is now exponential, with thousands of contributors. Only 2 students used BauWiki actively by editing articles. 46 students only read articles and 29 did not use it at all. 42 of 77 (55%) participants said that they at least partially benefited from BauWiki which shows the potential of the approach.

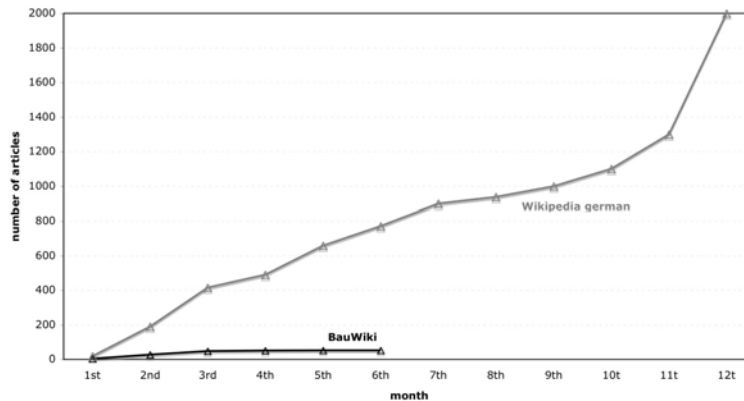


Figure 4: Number of articles in BauWiki and German Wikipedia.

The reasons for not using the Wiki-system were determined within the questionnaire. To get in-depth information regarding the main reasons for the poor performance of BauWiki, individual interviews were conducted with volunteers. As shown in figure 5 the majority did not use BauWiki due to lack of time for contributing or uncertainty because editing articles - especially editing formulae - seemed to be too complicated at first sight.

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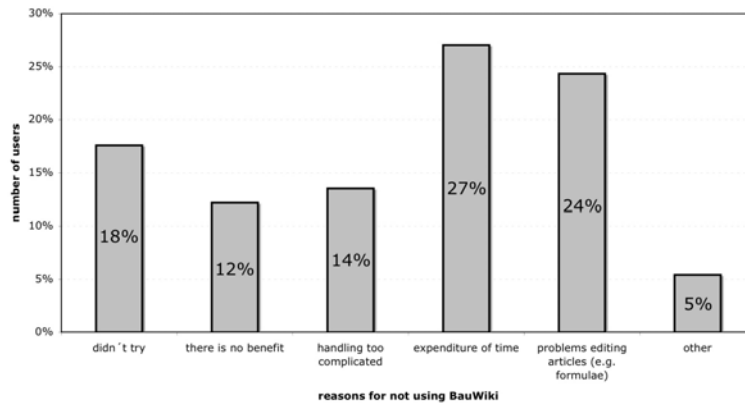


Figure 5: Why have you never edited BauWiki?

The people who contributed criticized the low content of the Wiki-system. Even though the tutors tried to give it a kick-off in creating a few articles and supervision had been assured, some students mentioned that there is no quality control for the content. There are different approaches to enhance quality control and neutrality of Wiki-articles e.g. [Kolbitsch05].

## 4 Discussion

It was interesting to notice that Wikipedia's ideas and principles did not work in our learning environment for higher education. Almost none of the students edited articles during a period of three months. From our point of view this is a remarkable result. What are the reasons for this behaviour of the students? As mentioned in chapter 3 nearly 60% of the learners consumed the BauWiki in a passive way by reading existing articles. Only 3% edited or wrote one.

Three major problems could be pointed out:

- Problem of the learning scenario: "I like using Wikipedia and contributing there. In my spare time I do not like to participate to BauWiki because it is all about my studies and no part of my personal interests or hobbies", a student stated in one of the face-to-face interview. This statement clearly shows one problem. Even though the majority of learners are convinced that the BauWiki is a good idea and will eventually help them through cooperation with each other, it is still a kind of learning scenario. Learning is cognitive effort and there has to be an immediate outcome (a mark or a grade), since working on a voluntary basis, in order to help the entire community, is unimaginable for most students today; this has to be taken into consideration during design and development [Holzinger05].
- Problem of the BauWiki growth: Voß [Voß05] reported in his article that all known Wikipedias now grow exponentially but always after a linear phase. This means that in the beginning of German Wikipedia there were, like BauWiki, only a few users who were writing articles. Only after a certain time and a number of existing articles more authors are willing to contribute.

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This means that similar to a typical newsgroup, new active participants only appear after a kind of lurking phase [Ebner05] and passive consuming. The duration of a typical lecture seems to be too short for this phase.

- Problem of the group work: Raitman mentioned in her research paper [Raitman05] that the students “felt the Wiki was easy to operate, but it didn’t really enhance the group as such”. This means that the Wiki-idea “to collaborate with each other” and to benefit from the knowledge of others did not work. Our study can confirm that there was no “community feeling”.

## 5 Conclusion and Future Work

In producing an online knowledge database within a higher education lecture some preconditions must be met. Learners usually consume the learning content and are generally not interested in creating it on a voluntary basis. Because of this, a critical mass of high quality articles must be readily available to overcome or to shorten the lurking-phase. In the early stages only a tiny linear growth of articles, produced by a very small group of contributors, can be expected.

Our future work will investigate whether or not the Wikipedia paradigms can be established if the learner is forced to write a short article and the system is an essential part of the lecture.

## 6 Acknowledgements

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