E-Learning 2.0 in hydraulic engineering education

Experiences with online collaboration

Stefan Walder
stefan.walder@uibk.ac.at

Hydraulic Engineering Unit
University of Innsbruck
Technikerstr. 13a, Austria
http://www.uibk.ac.at/wasserbau

Wolfgang Hagleitner
wolfgang.hagleitner@researchstudio.at

Research Studios Austria,
ARC GmbH
Studio eLearning Environments
Technikerstr. 21a/P, Austria
http://www.researchstudio.at

Abstract

In this contribution the experiences with e-Learning 2.0 applications by using a Wiki for the education in hydraulic engineering are shown. Up to now important information for the students has been prepared by the instructor. For this project the students were asked to collaborate and search on their own for the information they needed. Therefore a Wiki-system was used. For the engineering practice a self dependent realisation of tasks is an important requirement which students should be prepared for. With the help of online communication there should be shown the possibilities for students for working together in an interdisciplinary team. The positive experiences as well as the results of the evaluation of this project plead for a continuation of the application of e-Learning 2.0 for education. The comparison of results of tests without using Wiki and with using Wiki shows a qualitative tendency of better marks. In this contribution we present the application of Wiki in hydraulic engineering but the results can also be used for other engineering disciplines.

Keywords: e-Learning 2.0, Wiki, evaluation, engineering education

Zusammenfassung

Im folgenden Beitrag werden der Einsatz und die Erfahrungen von e-Learning 2.0 für die Ingenieursausbildung im Wasserbau gezeigt. Wurden bis heute die wichtigsten Informationen für die Prüfung vom Lehrveranstaltungsleiter zur Verfügung gestellt, mussten nun die Studierenden in Zusammenarbeit ein Wiki zur Prüfungsvorbereitung, welches später als Formelsammlung diente, selbständig erarbeiten. Die eigenverantwortliche Durchführung von Tätigkeiten ist für die Ingenieurspraxis eine wichtige Voraussetzung, auf die die Studierenden vorbereitet werden sollen. Weiters sollen mit Hilfe der online-Kommunikation Möglichkeiten aufgezeigt werden, die es den Studierenden auch in Zukunft erlauben in interdisziplinär zusammengesetzten Teams zu arbeiten. Die positiven

Erfahrungen, die damit gemacht wurden, sowie die Ergebnisse der Evaluierung des Projektes sprechen für eine Fortsetzung. Exemplarisch wird der Einsatz von Wikis im Wasserbau gezeigt, die Ergebnisse können aber durchaus auf andere Ingenieursdisziplinen umgelegt werden.

Stichwörter: e-Learning 2.0, Wiki, Evaluation, Ingenieurausbildung

1. Introduction to the topic

In working life engineers are continuously confronted with new tasks they have to solve by themselves. Every construction, not only in hydraulic engineering, is a prototype which has to be designed and realised by a team consisting of experts of different disciplines. The success of a project is often dependent of a good collaboration of every single team member. It is not always possible and necessary to discuss all themes in a face-to-face meeting. In the era of internet there have to be practised other methods of collaboration. Web 2.0 is the buzzword for the present internet society and starts to influence our every day life. It is probable that Weblogs, Wiki-systems or other e-Learning applications will be used at university in future (Ebner 2007)(1). The education at university has to deal with this theme intensively. To get to know more about the realisation of e-Learning 2.0 at university, it is important to use the new applications in the lectures and to evaluate their effect. A possibility for solving problems collaboratively is the use of Wikis. For this contribution we define Wikis as a selection of online pages that are not only read by the user but can also be edited. Nowadays Wikis are used for different disciplines and aims. In this contribution we focus on the use of it in hydraulic engineering education. With a group of 58 students the application of Wikis was realised, its effect on test results was reviewed and an evaluation of the project was done.

2. Problem formulation

Important notes for exams normally were provided by the instructor. This led to a pre-election of information, which made it unnecessary for students to search for information by themselves. In working life searching for information is the first step which is essential for realising projects in the further career. In the present knowledge society we are supplied with information by internet, the print media or television which should be sorted in a first step. To teach students how to use electronic communication technologies on the one hand and to work in teams on the other hand a Wiki was installed. Thereby a formulary was created. Every student had the possibility of editing old pages, creating new ones or only to participate. A first survey showed that only few students knew about Wiki and therefore its technique of using was presented in a presence lecture. Because of the following evaluation, which results are presented later, questions to user behaviour, acceptance, relevance and personal impression are resolved. These data are used as base for further collaboration projects. The students' suggestions are used in a second case study and their effects are evaluated again.

3. Approach and Methodology

It is too early to estimate how phenomena like Web 2.0 or e-Learning 2.0 keep what they seem to promise (Kerres 2006)(3) and if social software as tool for collaborative learning has a lasting effect on the "topography" of didactic academic knowledge supply. But it is obvious that the changes in the internet use which is subsumed in the term Web 2.0 lead to drastic changes. These changes concern a) technical possibilities which enable an active creation of the topics by the user and therefore b) the role of the learner who is asked to work with new media and to create rather than consume, c) the quality of relations between teachers and students (Hug 2003)(2), d) the individual information management which challenges more autonomy in the individual learning and therefore more competences of self control and self organisation (Ziegler, Hofmann and Astleitner 2003)(5) or e) the ability of selecting out of the information clouds and estimation of the origin and quality of every information.

Projects as the here presented examination-Wiki enable the possibility to test and to make visible these potentials and if necessary to find alternative application possibilities. Thus it is necessary to accompany such approaches with empiric methods and to evaluate them. Approaches already exist e.g. the work of Wageneder and Jadin (2006) which discussed alternative application possibilities of social software concerning teaching at universities and presented two evaluation results received by the application of Wikis in the context of e-Learning.

In this contribution we would like to present evaluation results received by the application of Wikis which was created by students at the Institute of Infrastructure, Unit of Hydraulic Engineering. The questionnaire was distributed after the final exam. The short questionnaire was reviewed by an expert for questionnaire construction before it was used. To receive more questionnaires an online-based survey was avoided. Instead of this a paper-pencil test was done. The participation was anonymous and voluntary.

4. Results

Out of 58 participants of the lecture 55 did the final test. 53 of these filled out the questionnaire. The students were asked to evaluate the application of Wikis in the lecture with the in Austria conventional school mark system (from 1 = "very well" to 5 = "not enough"). With an average of m = 2,13 and a modal value of two ("well") with a relatively little variance (SD = 0,98) the application of Wikis was evaluated positively by the students. This estimation is confirmed by the results of the control-item "Wikis should be continued". So 70 % of the students favour a continuation of the Wiki project with an average of m = 2,0 (Fig. 1; 1 = completely correct; 5 = completely incorrect).

In view of a repetition measurement approaching in June 2007 and of the creation by authoritative data, we used in the following percent data. One person corresponds with case number of N = 53 approximately 1.9 %. The short survey showed that over 60 % of the students didn't know or only knew little about Wikis. But 55 % used the Wiki for the

preparation for the test and 74 % thought that the Wiki was helpful for the final exam. Therefore it can not only be assumed that the students not only experienced competence with the use of new media but also that this tool enriches the lecture.

At the beginning it was assumed that a big part of students had only few experiences with Wikis and therefore an item with the question for quality of the introduction and a further item for usability were used. 78 % said that "the introduction for the application of the Wiki was sufficient" and 60 % thought that the "editing of the Wiki" was easy. Concerning the "structure of the Wiki" 23 %, an average of m = 2,6, thought that there could be done some improvements. 40 % of the students hardly read the new contributions. To make visible the improvement potentials the questionnaire was extended by an open question "suggestions, wishes, problems,…".

The feedbacks criticised the late completion of the Wiki, the complexity and the bad quality of the diagrams and tables. Some were against writing formula in the Wiki or mistrusted the edited formula of other students and preferred a formulary of the teacher. The advantages of the Wiki were the innovative character of collaborative learning and the quantity of the entries ("…not too much or too less"). The question "I did at least one entry by myself." was answered with "yes" by 15 students and with "no" by 38 students (N = 53). An open question (If no, why not (e.g. technical difficulties,…) about this remark should be used to get to know something about the reasons. The mostly mentioned reason for not editing was that the topics were already realised (9 out 17 feedbacks). Furthermore lack of time, no internet access or motivation problems were mentioned.
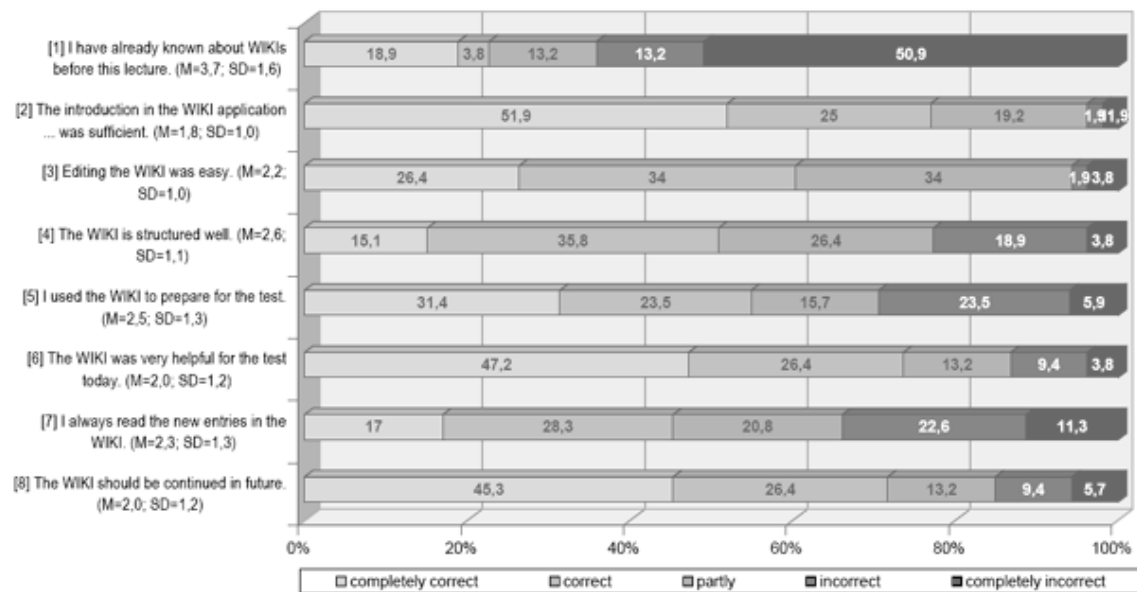

Figure 1 - Distribution of the answers in percent.

5. Conclusion

The application of Wikis was thought to be a successful innovation not only by the majority of students but also by the teachers. Therefore it will be continued in the winter term 2007/2008. The acceptance and the usage of this learning technology could be increased, if some marginal adaptations were done. It should be assured that all students are capable of editing contributions. Furthermore it could be discussed with students which topics should be edited and by whom. It should be guaranteed that students who want to edit their contributions can do so and that a sufficient variation of topics is available. The Wiki can get a better structure too. The editing of formula should also be reviewed. Maybe a normal formulary is more efficient in this case. The quality of the diagrams and tables should be improved. Finally by using RSS-Feeds the availability, the accessibility and the presence of Wikis and therefore the regular reading of the contributions could be increased.

6. References

(1) Ebner, M.: Wikipedia - Hype oder Zukunftshoffnung in der Hochschullehre? In: Günther, J. & Forum Neue Medien Austria (Hrsg.): E-Learning: Strategische Implementierungen und Studiengang, Tagungsband 13. FNMA-Tagung, 17.-18.11.06, Graz, 2007, S. 139-146. URL: http://lamp.tu-graz.ac.at/~i203/ebner/publication/07_fnma_wiki.pdf . (last check: 2007/05/24)

(2) Hug, T.: Interview. In: Der Standard, 1st September 2003.

(3) Kerres, M.: Potenziale von Web 2.0 nutzen. In: Andreas Hohenstein & Karl Wilbers (Hrsg.): Handbuch E-Learning, München: DWD – vorläufige Fassung 5. August 2006. URL: http://mediendidaktik.uni-duisburg-essen.de/files/web20-a.pdf . (last check: 2007/05/24)

(4) Wageneder, G.; Jadin, T.: eLearning 2.0 – Neue Lehr-/Lernkultur mit Social Software? In: Günther, J. & Forum Neue Medien Austria (Hrsg.): E-Learning: Strategische Implementierungen und Studiengang, Tagungsband der 13. FNMA-Tagung, 17.-18.11.06, Graz, 2007. URL: http://wageneder.net/artikel/fnma-13.html . (last check 2007/05/24)

(5) Ziegler, K.; Hofmann, F.; Astleitner, H.: Theorien selbstregulierten Lernens als Grundlage zukünftiger Lernumgebungsgestaltungen. Ein Überblick über den internationalen Stand der Forschung. In: Gary, C., Schlögl, P. (Hrsg): Erwachsenenbildung im Wandel. Theoretische Aspekte und Praxiserfahrungen zu Individualisierung und Selbststeuerung, Wien, 2003, p 132-141.