Building information and communication competence in a collaborative learning environment (K3)

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Abstract:
K3, work in progress, an acronym for Kollaboration (collaboration), Kommunikation (communication) and Kompetenz (competence), will provide a knowledge management software that supports collaborative knowledge production in learning environments. The underlying hypothesis is that collaborative discourse conciliates information as well as communication competence better than traditional methods of instruction. The collaborative, communicative paradigm of K3 is supported by asynchronous communication tools as a means of constructivist learning methodology. In summer semester 2003 the course "Communicative paradigm of knowledge management" was applied as a first case study of K3´s didactic concepts in teaching with the help of traditional communication software such as an electronic communication forum, but also by using the online collaborative dictionary ENFORUM (www.enforum.net). The conceptual design of the lecture was based on blended learning and a variation and combination of behaviouristic teaching methods like traditional lecturing and constructivist teaching methods in collaborative group work orders and individual glossary work assignment (using ENFORUM). The students´ evaluation of this lecture provided some important clues concerning the further development of K3. Basic findings are: Individual concept oriented work is bound to high learning skills as a prerequisite. Skills that could be learned stepwise i.e. with the help of clearly cut group work orders. Clear and specific working guidelines as well as immediate rating feedback are seen as very important orientation guides. Within these constraints students rate self determined collaborative work and autonomous individual work very high and inspiring. To measure the success in learning within this paradigm is still a challenge, because permanent intellectual evaluation of students´ entries in the forum and the dictionary is very costly whereas automatic rating processes with their limited quality control are not well accepted by students so far. Altogether participants judged learning success when achieved by collaborative and electronically supported techniques at least as high as success achieved when lectures where the primary means of teaching. In general, the students´ feedback with regard to the didactical course concept was completely positive. On the software part, in particular with respect to the electronic communication forum, there was some complaint that available orientation means (so far mainly based on the thread paradigm) were insufficient, but, nevertheless, in general, asynchronous communication software as a basic means for knowledge sharing was assessed as useful as long as the negative effects of cognitive overload can be avoided. Therefore one of the major challenges for K3 is the development of adequate methods for structuring communication forums and the visualization of knowledge and discourse structures in collaborative work.

1. Introduction

K3 is a knowledge management project based on the assumption that knowledge production as well as information competence are to a large extent the result of communication processes

"Information is thus not just the result of a particular distribution or retrieval process, using and applying existing knowledge to new problems – although this, of course will still be a major impetus for innovation -, but is also the result of communication processes. This can be called the *network or communication approach* to knowledge management." [Kuhlen, 2003]

Knowledge management is regarded as an essentially cooperative process in which different people collaboratively work together to share and build up knowledge. In this way K3 transforms traditional understanding of knowledge management, that is often based on a kind of „data warehouse" paradigm, to a more communicative view. Therefore K3 aims at the development of asynchronous communication tools as a central part for knowledge building by complex discourse.

The main operational area of K3 is academic teaching. The aim is to build up on the one hand *information literacy* and on the other hand *communication competence* in learning contexts. Today the ability to acquire new knowledge as well as the competent use of information (resources) are of almost the same importance as elementary reading and writing skills. Information literacy is not the same as computer literacy. Information literacy primarily includes abilities to use available information resources, for example libraries, journals, search engines to search, find and select needed information, to evaluate their relevance and validity and finally the skills to apply this information in given contexts [The Association of College and Research Libraries, 2000]. So information literacy can be seen as a receptive information retrieval competence, that enables people to access and use already existing knowledge.

Communication competence goes beyond that. It can be seen as the ability to argue one's opinion and to give adequate feedback to other people's view. It is the necessary base to construct new knowledge through the exchange and reflection of different people's knowledge and opinions. This ability is crucial to achieve the best possible surplus value in knowledge management surroundings. Communication competence is needed in any collaborative work and thus, as a "soft" skill is of high professional relevance.

2. Collaborative knowledge management in teaching, case example: lecture "to the communicative paradigm of knowledge management"

In the summer term 2003 we provided a course "The communicative paradigm of knowledge management" where several aspects of what we had in mind as a suitable learning environment were tested. Since the K3 software was not yet finished, we used a Pearl-based communication forum and the system ENFORUM[1] which was K3's predecessor project in the course's virtual phases .

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[1] See http://www.enforum.net for further information in German

2.1 General conditions - Concept of the course

The basic course concept was that of *blended learning* [Kerres & Voß, 2003] – which means that we used a combination of face to face and virtual phases to reach our established learning goals.
We assumed that computer supported learning environments are not predominant to other arrangements a priori. [Schulmeister, 1997] To mix the single advantages of different methods seems to be a suitable way to improve learning situations. [Kerres 2001]
The aspect of classical scholar's lecturing was reduced to approximately 30 minutes per 90 minute lesson. The lecture part served as a short overview for new topics. After this period we switched to methods that focused on the students' activation. Our assumptions regarding this design was that knowledge construction through active collaborative work is more effective and accepted than merely receptive individual learning for the student's majority.
The course was attended by 10 students, so that the group's size guaranteed a good working environment. All the students were advanced learners regarding the number of semesters that they had already finished (>4 semesters).

2.2 Expectations of the participants

The course's evaluation design included two questionnaire surveys at the beginning and at the end of the course. The first questionnaire focussed on the participant's expectations. The answers were spread on the spectrum of learning knowledge management essentials, training how to work effectively in virtual groups and learning how to argue one's opinion in a constructive way. The students highly appreciated interesting exercises that showed them the benefits and limits of electronic communication forums and collaborative work.

2.3. Contents and sequences

The course consisted of the following main topics:
- basic concepts of knowledge management
- models of computed facilitated communication
- peculiarities of asynchronous and synchronous communication
- collaborative encyclopaedias
- motivation and rating systems for knowledge management
- visualization of knowledge structures
- collaborative e-learning
- evaluation of knowledge management concepts

After short introductions into new concepts of the course's main topics that were mainly given in a traditional lecturing style the student's worked in two stable groups of five members on questions concerning the main topics. The group work was divided into face to face meetings and virtual phases. When the groups held face to face meetings we used the regular course's timetable for this purpose. The time and place for virtual exercises was mainly organized by the student's themselves.
Besides the group work every student had to do individual work which consisted of defining and commenting conceptual knowledge terms with the help of the ENFORUM software. The idea was that after hearing the short lecture on new concepts and working on new topics with the help of group exercises the students should be able to do define central terms with their

own words and to comment terms of the colleagues in a constructive way. They were also encouraged to having their ideas supported by information from external resources.

The individual work was solely done in virtual phases and the students could start with it right from the course's beginning.

The group work based mainly on three exercises that focussed on central aspects of knowledge management regarding the learning context. For the work on this three exercises the students achieved 60% of their final mark. Each group received one common mark for their collaborative work. The rest was achieved by the individual glossary work with the ENFORUM software.

During the course topic "Evaluation and rating in knowledge management systems" there were intense discussions on how a just rating system could look like. The scholars rated every single contribution for one week following the established pattern.

A very important factor for the success of the group work in virtual environments is that of the student's ability to moderate the communication process. [Kuhlen, 2001]

As a first main exercise the student's groups had to point out central aspects of two collaborative encyclopedias. As a result the students had to put one final presentation of their discussion on the main aspects in the communication forum which one of the scholars presented in the next face to face meeting. With this design we aimed mainly at focussing the difficulties of comprehensiveness of forum contributions. The second exercise was to define the three central learning theories (behaviourism, cognitivism and constructivism) with the help of group-chosen examples.

The students´ main task was to find and discuss convincing examples for underlining the theories. The examples were presented and discussed once again in a face to face meeting. The finding of the examples was a very individual process which stressed even marginal differences between the learning theories in a very good way.

The last exercise dealt with the evaluation of an e-learning concept. This exercise was very near to practise. The students' part was that of e-learning experts counselling an university.[2]

2.4 Evaluation: experiences and feedback

The questionnaire at the course's end brought out that the students didn't experience disadvantages comparing the course with a traditional lecture. Although the amount of knowledge that could be discussed was smaller than in a traditional lecture, the students claimed that they gained sustainable knowledge on the main topics. It seems that such a mix of face to face and virtual phases often proofs more suitable when the amount of knowledge is reduced in favour of more time for discussion and exercise.

The students´ feedback was that the variation of teaching methods including parts with more self determined collaborative work is motivating and inspiring but probably less apt for basic lessons with the primary goal of mere knowledge acquisition. Although we didn't test the teaching methods with bigger group sizes like they usually occur in beginner's lectures yet we assume that the K3-concept will be especially suitable for smaller groups of more experienced students.

The continuous face to face phases were experienced as very important for the learning process. They offered the possibility to reflect the virtual phases organisation and problems in a very effective way and helped to keep up the participant's motivation. Like [Kerres 2001] assumed, the group rediscovered the "Magic of presence" with the help of the chosen method mix. Thinking about the rating of student contributions it became clear that it is not realistic to rate every single contribution. Proposals for automatic rating systems or peer rating came up

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[2] we thank Prof. Dr. Margarete Boss and Dr. Andrea Müller from the department for Social Psychology at the university of Göttingen for allowing us to use this exercise

but were not very well accepted by the students in the ongoing discussions. For K3 this is still one main aspect where intense research is necessary.

3. Conclusions

What could be learned from the students´ opinion and feedback? What requirements to the ongoing K3 project can be reasoned? First of all and very important, the students´ feedback to the course as a whole was very encouraging. Participants judged learning success achieved by collaborative and electronically supported techniques at least as high as success achieved by traditional learning. That means the applied didactical concept seems to be an appropriate teaching and learning method.

But there are some constraints that need to be considered.

1.) Concept oriented work takes high learning skills as a prerequisite. That indicates that the didactical course concept based on the variation and combination of different teaching methods combining individual and group working parts and alternation between real lessons and virtual phases is probably less apt for basic lessons with the primary goal of pure knowledge acquisition of beginner students and rather adequate for experienced students in advanced lessons. Furthermore virtual exercises without detailed working guidelines are overstraining to a large part of the students. Therefore it is essential to provide the necessary resources and motivating exercises for the efficient use of the K3 environment to the participants. This could be achieved right from beginning of future lectures with the help of clear cut and extensive working guidelines that include detailed instructions concerning the topic and goal (what do to) on the one hand and the solving process (how to achieve) on the other hand of given task orders. Working guidelines will be employed to build up the necessary learning skills on the part of the participants.

2.) Students appreciated immediate rating as a very helpful feedback. Participants said such quick rating on the one hand motivates to actively contribute to virtual discourses and on the other hand delivers clear hints of what is expected on the side of the lecturers and alleviates to rapidly enhance the quality of contributions. But ongoing intellectual evaluation of students´ contributions is very labour-intensive whereas the idea of automatic rating processes with its limited quality control is, as already mentioned, not well accepted by students yet. Students don't trust automatic rating and just don't want to be judged by algorithms even if the assessed scores would be valid. The question is how to make rating more feasible? It could be asked if it is necessary, possible and even helpful to rate every single contribution that participants made. A first idea to solve this problem is to rate only a subset of all contributions. Maybe it makes sense to rate only the "final" contributions that deliver the result of the given working task. Another possibility is to rate a certain number of contributions of which the participants think they're the best and therefore suggest it for rating. Further investigation in future lectures is needed to work out more handy rating methods and procedures. The main conclusion concerning rating is that automatic rating processes could serve as first filters that do not determine the complete rating but support the scholars in their rating decisions.

3.) Students judged the used electronic communication forum software as a useful basic means for knowledge sharing and construction. Both forum software, the IW-Lehre Forum[3] and also ENFORUM[4] are primarily based on the thread paradigm to display their forum entries. There was some complaint that these forums are confusing and complex, no longer usable in an intuitive and practical way if the number of contributions exceeds a certain threshold. That indicates that presently available orientation means were insufficient. To counter the negative effects of cognitive overload it could be helpful to develop new concepts for semantically structuring communication forums and/or implement new visualization techniques that ease the traceability of argumentation, as well as knowledge creation and reuse. A first idea is to provide possibilities to semantically mark-up contributions as a whole, for example as an argument, a question, an answer, a thesis and so on, and also subparts of the single contributions themselves. Figure 1 gives an impression of the implementation in K3.
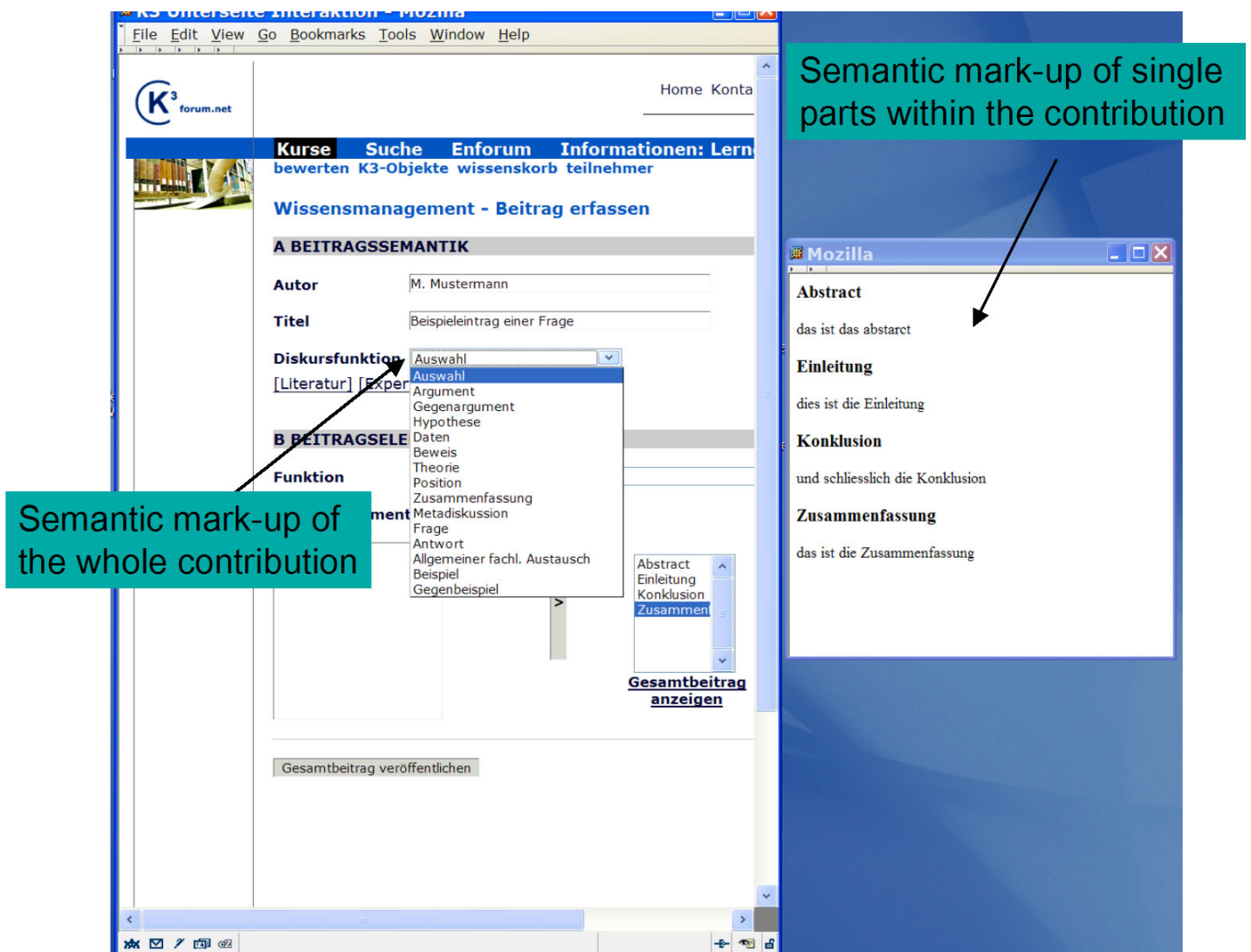

Figure 1: Semantic mark-up of contributions

[3] [http://www.inf-wiss.uni-konstanz.de/cgi-bin/wt_lehre/wwwthreads.pl?Cat= 05.10.03]
[4] [http://www.enforum.net/www/inf/iwk/enforum_studenten.nsf/Enforum?OpenFrameset&Login 05.10.03]

This could be combined with graph-based visualizations that display alternative layouts of discussion forums. Figure 2 shows an experimental graphic representation in ENFORUM that: (1) provides chronological traceability of messages, allows (2) a clear separation of threads and (3) a degree of topicality by diverging icon size, (4) emphasis of the most current and controversial discussion threads, and (5) the labelling of messages which match the interest profile of the current user.
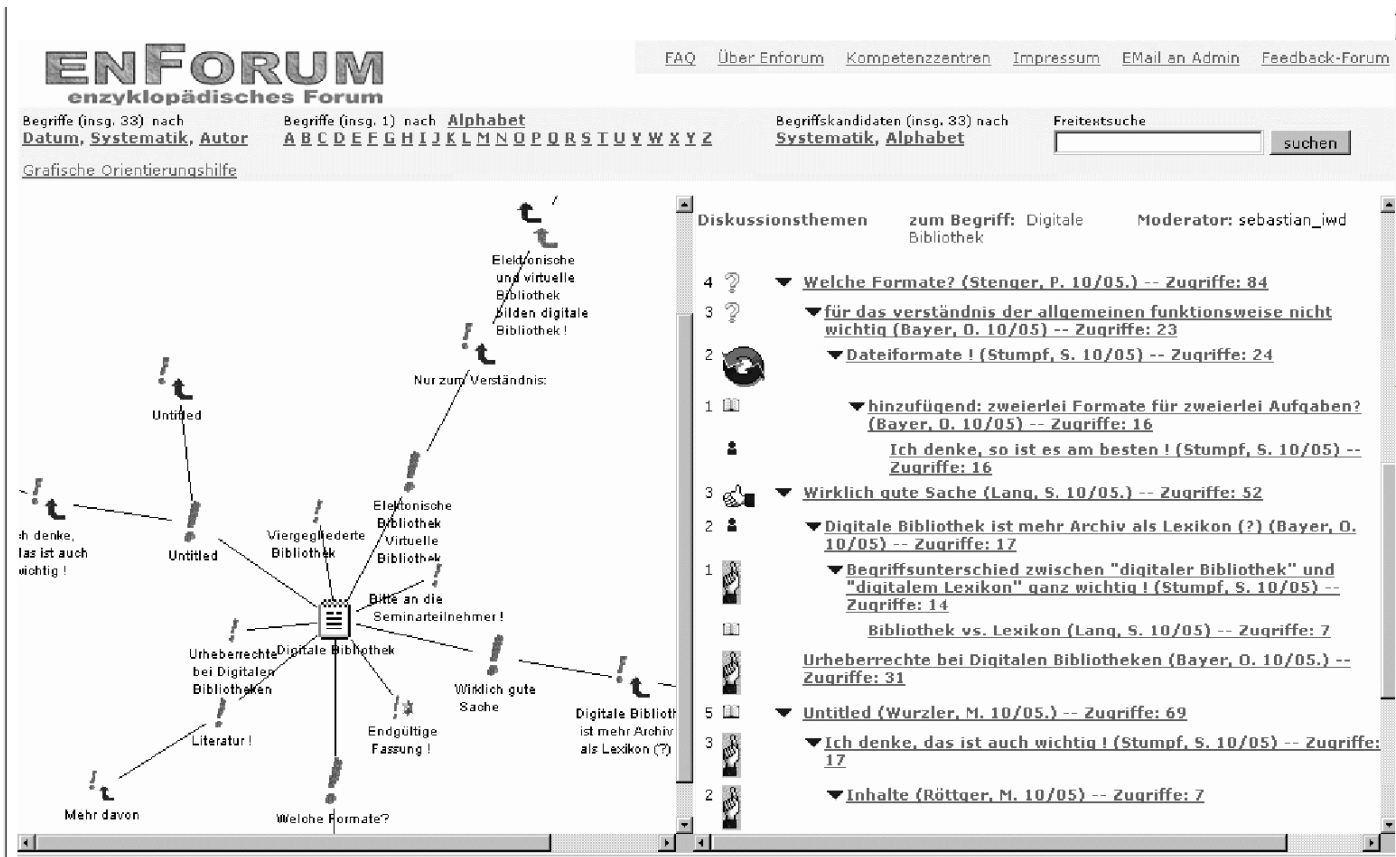

Figure 2: Visualization of forum threads (left) vs. traditional message threads (right)

4. Current status and progress of K3

The current status of K3 is as follows: The fundamental software design and teaching concept is already developed. The use-case lecture served as a first fundamental evaluation concerning the grounding teaching concepts of K3. Students feedback serves as valuable input for programming, which starts in October 2003, for the refinement of the didactical concepts as well as the application of the rating mechanism. A first prototype is to be expected by the end of 2003. Further evaluation results will be published at the project homepage that can be found at [http://www.k3forum.net].

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