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A Collaborative Lecture in Information Retrieval for Students at Universities in Germany and Switzerland

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Abstract → *Zusammenfassung* → *Résumé*

K3, work in progress, is an acronym for Kollaboration (collaboration), Kommunikation (communication), and Kompetenz (competence). K3 provides a platform in the context of knowledge management to support collaborative knowledge production in learning environments. The underlying hypothesis states that collaborative discourse conciliates information as well as communication competence in learning contexts. The collaborative, communicative paradigm of K3 is implemented by asynchronous communication tools as a means of constructivist learning methodology. In this paper we will describe a K3 course. The lecture was organized and carried out at two places in two different countries (Germany and Switzerland) with students from different universities in the context of Library and Information Science. The paper informs about the management of the lecture and about the problems we had to run the lecture at two places. The circumstances in coordinating the presentations, the exercises, the examinations and evaluation, and the time schedule are presented. The conclusions of the lecturers and the results of a questionnaire for the students are explained in detail.

Zusammenfassung

K3 ist ein aktuelles Projekt zu Kollaboration, Kommunikation und Kompetenz. Mit K3 wird eine Plattform im Kontext des Wissensmanagement angeboten, welche die kollaborative Wissensgenerierung in Lernumgebungen erleichtern soll. Die zu Grunde liegende Hypothese besagt, dass der kollaborative Diskurs sowohl Informations- als auch

Kommunikationskompetenz vermittelt. Das kollaborative und kommunikative Paradigma von K3 wird mit asynchronen Kommunikationsmitteln als Mittel des konstruktivistischen Lernens erreicht. Dieser Text beschreibt einen K3-Kurs. Die Lehrveranstaltung wurde in Deutschland und der Schweiz organisiert und durchgeführt. Studenten zweier Hochschulen aus der Bibliotheks- und Informationswissenschaft nahmen an der Veranstaltung teil. Im Beitrag wird über die Durchführung der Lehrveranstaltung und über die Probleme mit der Dislokation an zwei Orten informiert. Die Erfahrungen der Dozenten und die Ergebnisse einer Umfrage werden dargestellt.

Résumé

K3 est un projet actuel pour la collaboration, la communication et la compétence. K3 offre une plateforme dans le contexte de la gestion de l'information, qui facilite la diffusion collaborative dans un environnement de formation. L'hypothèse soutenue dans l'article, dit que le discours collaboratif favorise et fournit une compétence d'information ainsi qu'une compétence de communication. Le paradigme collaboratif et communicatif de K3 est atteint par des moyens de communication asynchrone comme méthode d'apprentissage constructiviste.

Ce cours a été organisé et effectué en Allemagne et en Suisse. Des étudiants en bibliothéconomie et science d'information venant de deux Ecoles Supérieures ont participé à ce cours. L'article informe sur la réalisation du cours et sur les problèmes de la dislocation sur deux lieux. Ensuite les problèmes des phases de présentation, les exercices, les examens et la coordination du temps à disposition sont communiqués. Finalement les expériences des professeurs et les résultats d'enquêtes auprès des étudiants sont discutés de manière approfondie.

1. Introduction and Overview

The Internet has created new possibilities for collaboration in the last few years for science and private companies. Especially for geographically separated collaborators, the possibilities to work together independent of time and location have increased. Finholt [2002] states that besides electronic communication, increased interaction, the reduction of status barriers, and an enhanced usage of applications for sharing data, data visualization may follow. K3¹, work in progress, is a knowledge management project based on the network or communication approach to knowledge management suggested by [Kuhlen, 2003]. Knowledge production depends not only upon the efficiency of the distribution, retrieval and appliance of existing knowledge to new problems but to a large extent is also the result of communication processes and the collaboration in between the participants of a communication process. New models of innovative knowledge communities, especially the theory of knowledge building from Bereiter & Scardamalia [1996] directly connects knowledge creation with learning. The production of knowledge is an essential part of learning [Paavola et al. 2002].

The main operational area of K3 is academic teaching. In this context we expect that the quality of teaching and learning can be raised, if the network approach to knowledge management is successfully employed in university courses. It is widely believed that learning can be especially effective, if different people share their knowledge and are committed to

¹ K3 is a system that is developed at the University of Constance/Chair of Information Science. It is a project funded by the German Ministry of Science and Education (BMBF, project number: 08C5896). For further information see the project's website: <http://www.k3forum.net/>

argumentation and negotiation to work out common results and producing new knowledge [Tudge & Winterhoff 1993, van Boxtel & Veerman 2001].

1.1 Basic Ideas of K3

As computer supported learning environments are not predominant to other arrangements a priori [Schulmeister 1997] K3 takes a basic approach of blended learning. The fundamental idea of K3 is to enrich (classical) lecturing by boosting mutual communication and discourse through group work and self determined individual work of the students. Therefore K3 does not replace existing teaching methods but enhances learning situations by combining the advantages of different methods [Kerres 2001].

K3 helps organizing a course with constructivist and instructional elements. It is used to run complex discussions and group work as presenting knowledge in a controlled environment. Besides basic functionalities like acting as a file server to exchange teaching materials and providing asynchronous communication, K3 offers [Kuhlen et al. 2005]²:

1. A sophisticated system of intellectual, semi-automatic and automatic performance parameters as a means of permanent feedback and transparent gratification.
2. A MyK3 version to personalize the system for each user, be it a student or a lecturer.
3. Extended retrieval facilities.
4. A report generator to assemble a single student's or a group's contributions.
5. An elaborated administrator sub-system to enable the lecturers to organize their courses.
6. A visualization component, K3VIS to get a graphical, semistructured overview about a discourse.
7. A role system (moderator, presenter, researcher, and summarizer) to classify the responsibilities of students during a group work.
8. Typed discourse objects to organize and structure a discourse and allow ease of proximate actions, like retrieval and navigation.

K3 also employs a new evaluation system. It will help to raise motivation and facilitate continuous learning by giving prompt feedback to students' contributions. The evaluation system may replace or may be combined with a punctiform efficiency control, e.g. written examinations, which are usually employed at the end of the courses. The evaluation system rewards steady activity of the students.

The network approach of K3 places emphasises on constructivist education principles [Wessner 2001, p.196]. The intention of K3 lies to a lesser extent therein to conceive the theoretically best learning approach or to follow a learning theory³ but to find ways to facilitate the quality of education through the successful employment of collaboration and communication in real life teaching. Feedback and experiences gained from explorative empirical settings serve as the primary source for the further development of the basic concepts of K3.

1.2 Overview K3 in teaching - experiences from preceding courses

From summer 2003 till winter 2004 the didactic basic ideas of K3 were applied with different features in a number of courses. Experiences we made were very important to design the

² More detailed explanations of K3 system and the underlying concepts are explained in Kuhlen et al. [2005].

³ For a critical view of the actual prevailing Constructivist learning paradigm see Kerres & de Witt [2004].

course Information Retrieval as a collaborative lecture for the students at Geneva and at Constance.

Evaluations and experience from preceding K3 courses were quite promising. Even before winter 2004 K3 ideas were multiply applied and gradually improved concepts, which were approved in practical experience. The main results of the preceding courses can be summarized:

- 1) The didactic concept of K3 makes sense and is successfully applicable in lectures with a medium number of participants.
- 2) Ongoing evaluation and timely feedback to students' contributions raises the quality of students' works significantly.

1.3 Research Design

The research goal of the information retrieval course in winter 2004/2005 was to investigate the question whether the quality of teaching and learning can be raised, if the ideas of K3 are employed in a dislocated lecture. The application of the collaborative idea of K3 primarily means that the course participants are constrained to engage in communication and discourse to produce new knowledge. Whereas collaboration is lifted on different levels:

- Group level: through group exercises in face to face and virtual phases.
- Community level: through individual concept oriented student work within the K3 system.
- Lecturer level: commonly constructed teaching materials.

To verify the effects of the named basic ideas of K3, we evaluated the definite employment of collaboration and communication. We investigated,

- A) whether the ideas are feasible, this is primarily a question concerning the costs.
- B) whether the quality of the achieved learning results seems to be better or at least equally good as in traditional courses.
- C) whether the different elements, respectively their combination were accepted by the students, respectively assessed as motivating.
- D) whether students judge the different elements, respectively their combination as raising learn success.

The evaluation methods we used in our field study combined qualitative and quantitative research methods [Pfister 2004].

A and B are evaluated primarily in a qualitative way through the observations and experiences made by the lecturers in the course of events. B and C are evaluated in a more controllable, quantitative way with the help of questionnaires at the beginning and at the end of the lecture which are complemented by personal interviews with the students. One has to keep in mind the explorative character of the results of this evaluation. The problems concerning the complexity of research designs in collaborative learning settings are well known and therefore the results of such evaluations have to be taken with care [Neale et al. 2004]. But the used research design is able to reveal problem fields of the course and at least indicates which elements and combinations seems to be worthwhile and therefore deserve further investigation.

In the following section two we will first describe the course in more detail with special respect to didactics. Section three gives information about the experiences the lecturers made, section four gives some hints about usage of the K3 system, and section five describes the

feedback from the students. We will finish with conclusions and requirements in the last sections.

2. Information Retrieval: a collaborative lecture for students in Germany and Switzerland

Based on the experience we made concerning collaboration on group and community level in preceding lectures the aim of the course “Information Retrieval“ in winter 2004/2005 was to expand the idea of collaboration to the organization of the lecture. In detail: curricular networking of different universities through coordination and collaboration of different lecturers. Our assumption was that collaboration in teaching can be effective, if lecturers share their knowledge and engage in argumentation to work out whole courses as well as single education units. Expected positive effects of mutual communication and feedback are twofold:

- 1) An immediate quality gain concerning conjoined prepared course materials, for instance lecturing presentations or work orders.
- 2) A long-range effective increase in teaching competence.

2.1 Course contents and teaching goals

The course Information Retrieval is an important part of the curriculum in Information Science in Constance as well as in Geneva. It takes place in winter term every year. Core matters are methodology and technology of information retrieval systems, professional online and internet searching and evaluation of information retrieval systems⁴.

The learning targets of the lecture are:

- Participants should know the essentials of the theoretical concepts and background of information retrieval.
- They should be informed about the most common information providers in the commercial, German speaking online world and about the best known search engines on the WWW.
- Participants should be able to plan and execute professional searches in commercially available online databases⁵ as well as on the Internet.
- They should be able to express their knowledge, to argue their opinion and to give adequate feedback to other people's view⁶.

The cooperation between the Chair of Information Science at the University of Constance and the Département Information documentaire of the Haute école de gestion de Genève enfolded the structure, the contents and the execution of the course.

- Structure of the course means widely congruently didactics and evaluation system.
- Contents of the course were commonly constructed and contained the teaching materials.

⁴ More details about the course and its topics at <http://www.inf-wiss.uni-konstanz.de/CURR/winter0405/ir/index.html>.

⁵ This can be regarded as a professional kind of “Information Literacy”, confer footnote 1. In this lecture “Information Literacy” is a real topic of the lecture. It is not only achieved through the didactic methodology like in other K3 lectures.

⁶ Confer footnote 1.

- Execution of the course means that the sequence of the lecture was organized parallel, predominantly executed separate in both locations, and partly collectively carried out with the participants in Constance and Geneva as “one audience” in joint work orders.

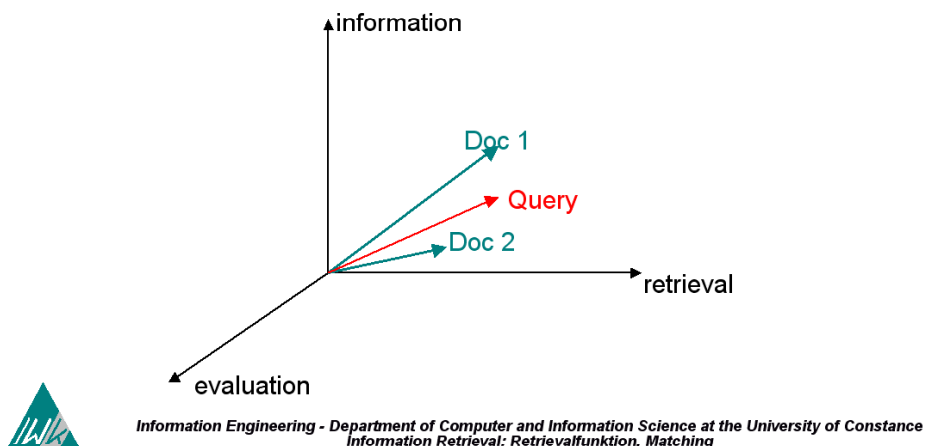
2.2 Didactics

The didactic structure of the course was threefold. We combined and varied the following teaching methods:

1. **Traditional lecturing with the aim of knowledge transfer in face-to-face lessons.** For most of the time parallel and apart in Constance and Geneva. Three lessons were planned as common video conferencing lectures. Face-to-face lessons claimed roughly 40% of the lectures time schedule. Figure 1 illustrates a typical slide in the lesson “matching process”

Vector model

Queries and documents are vectors in a n-dimensional space (dimension are determined through the index terms) → Axiom: correlation between similarity and relevancy



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Figure 1: Slide about the vector model used in information retrieval (translated in English)

2. **Group exercises executed in face-to-face and virtual phases.** Detailed working guidelines and workflow structure suggestions were provided especially for the initial work orders. This part took about 40% of the lectures time schedule. The following figure shows one of the group work orders.

Task: Analyze an ONLINE-HOST and work out the following aspects

1. Content focus and coverage: Range of topics, kind and number of offered data bases
2. Search Options: retrieval language, search fields etc..
3. Access conditions: price structure, target group
4. Customer service: Support during document procurement, document delivery, offer of search assistance and online help

Clarify diversification characteristics compared with other hosts. Try to point out the search capabilities with the help of an example. Presentation date is 16.11.04. Use K3 to compile the work order.

Workflow suggestion

1. The group specifies the fundamental operational sequence and determines, which member works out which of the named aspects, e.g. each of the team members compiles which one of the four central aspects (up to 5.11)
2. The researcher researches the necessary information resources (up to 6.11.)
3. The team members accomplish the textual analysis of the four aspects. Each member put their results in K3 (up to 9.11)
4. The summarizer compiles a total analysis from the single contributions (up to 11.11)
5. The researcher works out the search example (up to 11.11).
6. The presenter prepares out 4. and 5. (up to 15.11.) (consider: the quality of the presentation flows into the evaluation)

It is possible to arrange the workflow on own ideas. Deviations from the suggested operational sequence, and/or a different structure should be discussed and negotiated with the help of the forum .

Figure 2: Example of a group work order (translated in English)

Ten group work orders were scheduled, two of these as solely virtual exercises with mixed groups consisting of students from both universities. In the two virtual exercises a role model was employed to ease scheduling the responsibilities among the group members and to facilitate structuring of the workflow.

3. **Individual concept oriented student work within the K3 system aimed for voluntary collaboration on a community level.** This part was solely done virtual and was estimated 20% of the time schedule. Students had to work out:

- One definition of a term/concept connected to the course subject.
- Two comments on further questions from the lectures or other students or to the definitions worked out by other students.
- Four pertinent references (literature or hyperlinks) with detailed descriptions and formal citation.

The individual work with K3 was mostly self-determined. Students were able to choose time and topic of their work. Figure 3 displays an example of a student comment.

The screenshot shows a forum thread with three posts:

- Question (lecturer):** Titled "Information Retrieval a computer activity?". It asks for an opinion on whether information retrieval is necessarily a computer activity, citing Meadows (1991).
- Comment/answer (student):** Responds that information retrieval does not always require a computer, as most work is done by humans. The computer is just a tool.
- Feedback (lecturer):** Provides feedback on the student's answer, noting it is a justified position but lacks sufficient argumentation.

Figure 3: An example of a student comment in German

It is important to note that the “individual” work within the K3 system is meant to be individual only in contrast to the group work, where several students are obliged to work together on a work order. Even individual contributions receive feedback from the lecturers and can be commented by the other participants. Ideally the individual work in K3 leads to self-supporting discussions, resulting in an agile virtual exchange in which all participants of the course are involved. A discourse like this could be seen as a collaborative process itself.

2.3 Evaluation and rating system

The evaluation of the course was two-part in Geneva and three-part in Constance. In Constance the evaluation of the group exercises count 40% and the evaluation of the individual work with K3 count 20% of the final marks of the students. An individual term paper at the end of the lectures counted 40% of the final grade. Because of a smaller number of ECTS⁷ points at Geneva there was no individual term paper, but only the group work (70%) and the individual work (30%). The lecturers gave immediate written, sound and detailed feedback to group work and to the individual work in K3. Therefore 60% in Constance and 100% in Geneva of the final marks were rated consecutively during the course. Figure 4 outlines the evaluation system used at Constance.

⁷ The European Credit Transfer System (ECTS) “is a student-centred system based on the student workload required to achieve the objectives of a programme, objectives preferably specified in terms of the learning outcomes and competences to be acquired.” http://europa.eu.int/comm/education/programmes/socrates/ects_en.html (11.5.05).

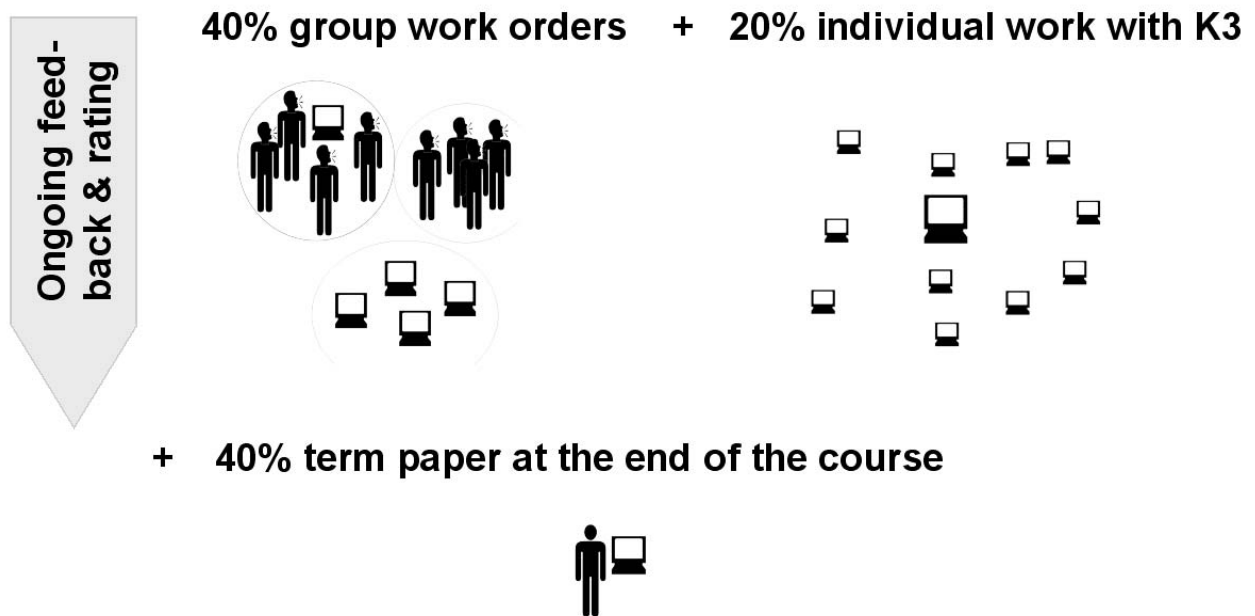


Figure 4: Evaluation of the students in Constance

2.4 Employment of the K3 system

The K3 system was employed as a file server that provided all course materials created by the lecturers and students. All results of the group work had to be published in the system, even the results from orders that were executed face-to-face during the course. Furthermore the individual virtual work had solely to be done within K3. Finally feedback and evaluation were represented in the system. We decided to present all materials and all discussions to all participants. That is all entries were visible and open for further discussion for all members of the course. Even the feedback and evaluation done by the lecturers were visible all of the time for everybody to keep the knowledge construction process as well as its results public and transparent.

2.5 Course settings

The number of participants in Geneva was 6, 12 students took the course in Constance. The lecture was a compulsory course for the students from Geneva and an optional lecture at the University of Constance. The number of participants was stable throughout the whole term not only in Geneva but also in Constance. At the end of the lecture there was one drop-out in Constance. The student told the lecturer that he did not need the course certificate and that he did not have the time to finish the term paper.

3. Experiences from the lecturers' point of view

The cooperation of the lectures was manifold. Organization and structure of the course was planned together and could be almost run as intended. Most of the lectures and exercises could be done parallel and in respect to the planned time schedule. Due to different vacation weeks, length of the semester, and different previous knowledge of the students in Germany and Switzerland 80% of the lectures as well as 8 out of 10 group work orders were carried out

parallel. One of the group works could be performed with mixed groups as virtual group work with students from Constance and Geneva.

Because of illness of one lecturer, some technical problems, and ongoing exchange about the teaching materials the lecturers had some more coordination costs. In our personal review particularly the good acquaintanceship of the lecturers and therefore very uncomplicated and easy to handle communication between the lecturers helped us to solve these problems.

The collaboration concerning the teaching materials was very helpful for the lecturers. Just in a field like information retrieval, a topic that develops further steadily, it was quite productive to communicate and exchange ideas for the lecturers. The result was that presentations and group work orders were multiply annotated, revised, modified by the lecturers, so that the quality of the teaching materials was quite high, at least much better than if produced only by one lecturer⁸.

3.1 Ongoing feedback and progressional rating

The overall quality of the students' group work and individual work was high to very high. Concerning the group work we found a strongly increased performance during the first two work orders and henceforth the groups kept a very high performance level till the end of the course. The contributions the students made in the context of their individual work with K3 were also of excellent value, sometimes going far beyond the requirements of the lecturers. From the viewpoint of the lecturers the individual contributions in form of definitions, comments to further-going questions and references deepened not only the knowledge of the students and facilitated information literacy and communication competence, but notably disclosed if and where single students needed particular textual assistance and help concerning the training of writing skills through individual feedback. This comparatively high performance grade of the students is presumably connected to the effects that ongoing feedback and progressional rating causes high motivation, and enables students to a rapid error correction. Last but not least it offers chances to accomplish an enduring increase in efficiency for the students [Griesbaum 2004, p.31].

But the positive effect of the evaluating scheme of students' work is accompanied by a big disadvantage for the lecturers. Giving feedback to every group work and individual work is very time-costly, especially in comparison to a written examination. Although the feedback to the group work orders focused mainly on the output of the group process and not to the single steps or contributions during the working phases, feedback to group work orders claimed roughly half a day of work for the lecturers every week. There is a big difference between giving a spoken feedback and writing a sound analysis of the group work that clearly states the performance of the group in relation to the requirements, naming the "well done" points and giving hints for further enhancement. Whereas the effort of ongoing feedback concerning the group work orders is high and finally feasible the cost for giving profound and helpful rating and feedback to the single contributions of the students' individual work with K3 is difficult to estimate. One can imagine that it was very time consuming to evaluate seven partly ample contributions per student⁹.

⁸ It is very difficult to objectify this statement. Evidence to support our view is the fact that mutual reviews of presentations sometimes resulted in "error" corrections. E.g. out-of-date information concerning web retrieval systems was mentioned and additional information was frequently supplemented.

⁹ Keep in mind that the lecturers had to read and judge every unknown article or linked web page a student presented as a relevant reference to the course.

4. Use of the K3 system: communication behaviour at the group and the community level

K3 has been used by the students as it was specified by the lecturers. There were intense online discussions during the group work and nearly all students fulfilled the individual work assignment within K3 without any problems.

But beyond explicitly specified collaborative activities (group work assignments) there were no continuing discussions. Figure 5 illustrates two discussion threads that show typical discourse behaviour on the community level, where a lecturer asks a question, a student gives a comment and an instructor gives feedback.

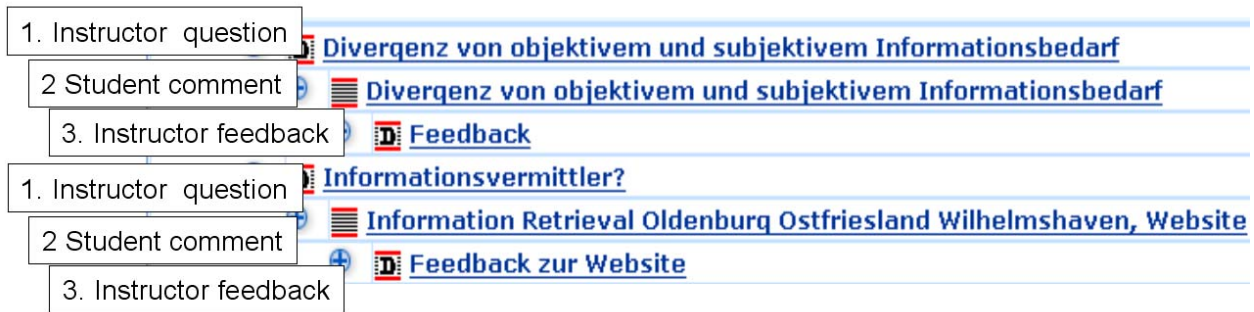


Figure 5: Two discussion threads that shows typical discourse behaviour

There was only minimal interaction and discussion between students in K3 on the community level. Only in one single case a student commented an entry made by another student. Students interacted with the lecturers but not among each other. A self-supporting discourse between the participants of the course did not arise. The possibility to read and comment all entries from other participants did not automatically result in a broadened communication flow with active discourse. During the course there was only one occasion where a student initiated a group spanned communication between participants in Constance and in Geneva. Figure 6 points out that the prevailing communication flow predominantly remains instructor- and inner group-centered although K3 was adjusted as a transparent and public room¹⁰.

¹⁰ Confer 2.5 Employment of the K3 system.

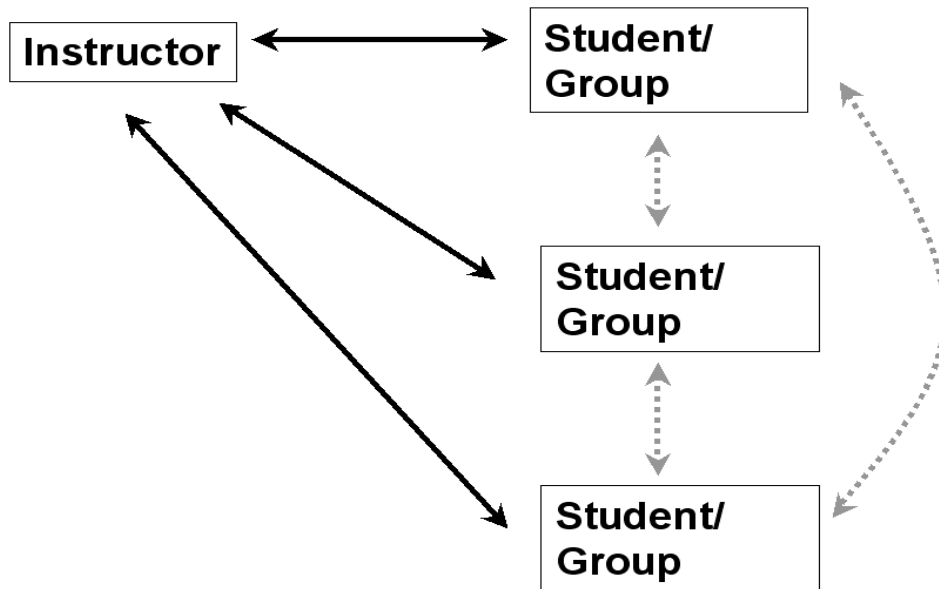


Figure 5: Realized and not realized communication flows in the K3 system. Black arrows indicate realized communication flows. Grey, dotted arrows indicate potential but hardly realized communication flows.

Besides the specified mixed group work only one more interuniversity communication situation occurred in K3, where students from Geneva did not hesitate to comment questions by the lecturer from the other university and vice versa. This indicates that the students got no problem to accept and communicate with another, personally unknown lecturer in the virtual space.

The one dislocated group work order was a success. We built 3 groups each with 2 members from Geneva and 2 members from Constance and 2 groups each consisting of 3 participants from Constance. There was no difference regarding the quality of the group work result between the mixed and the groups with students from Constance. Figure 6 shows that the number of contributions in K3 of the mixed groups was about three times higher as the number of contributions from the groups in Constance.

Group name	Number of contributions
Ask (mixed group)	53
Findforward (Constance group)	18
Vivisimo (mixed group)	63
Surfwax (Constance group)	22
MSN (mixed group)	71

Figure 6: Number of contributions in the dislocated group work assignment “analysis of search engines”.

5. Evaluation & feedback by the students

The aim of an evaluation run at the end of the course was to collect the students’ opinions primarily in respect to a) their acceptance of the basic didactic concept as the constituent characteristics of the course and b) their estimation of their individual learning success. The evaluation was done with the help of a questionnaire, all 18 students from Constance and Geneva filled in. Some supplementary personal interviews have been done by the lecturers with the students.

Pertaining the question what they did learn, students answered:

- Structured, efficient and effective research.
- Overview and basics of information retrieval.
- Group work.

Although they did not formulate it in the same words their answers corresponded to the learning targets mentioned in section 2.1 very well.

Students said their learning success was high to very high and the working load was very high. In comparison to other courses, two thirds expressed the belief that they learned more. One student said that he learned less than in other lectures. The rest did not see a difference between this K3 type course and other lectures they attended in respect to learning success.

5.1 Feedback concerning the teaching methods and their combination

Three out of four students told that the combination and variation of the three different teaching methods – lecturing, group work orders, individual virtual work – improved learning success in comparison to standard lecturing. Especially group work was judged as motivation and facilitating learning success. Half of the students did not want to miss one of the teaching components but a minority of a close third would prefer to abandon individual virtual work within K3. On the other hand over 80% said that classical lecturing is an important part of the course that they did not want to miss. And three of four students accounted that face-to-face phases are important. Interesting enough there is a gap between students' judgement concerning motivation and students' rating of learn success concerning the individual work with K3. Whereas two third of the students judged individual virtual work as not to increase motivation in comparison to traditional lecturing, the majority rated it as raising the learning success. About 70% said that the concept of individual work is sound and useful, but most students thought that the additional individual work on the community level increased work load to much.

Concerning the best assessed teaching method - the group work orders - nearly all students explained that detailed working guidelines and workflow structure suggestions are important and helpful elements of collaborative group work.

5.2 Feedback concerning the evaluation system

Students' judgement of the evaluation system strongly indicates the importance of lecturer feedback as a key factor of learning success [Allan 2004]. 75% of the students expressed that ongoing evaluation raised their learning success in comparison to the usual employed punctiform performance measurement systems. There were some significant differences in the judgement of the evaluation system between the participants in Constance and in Geneva. Students from Constance rated the motivational effects of the progressional evaluation far better than students from Geneva. Whereas nearly 90% percent of the German students said that progressional evaluation and feedback raises the motivation, only one third of the students from Switzerland agreed on that.

A majority of the students accepted the idea that the evaluation of the group work was part of their final individual marks. But two thirds of the students from Geneva said that such a mixed rating system is unjust, in contrast to that over 80% of the German students specified it as equitable. The reasons for these deviations concerning motivation and judgement of mixed

composition of individual final marks are rather unknown. One has to keep in mind that the results of students' feedback, especially those from Geneva should be carefully interpreted for the very reason that the number of students is very small. The lecturer in Geneva, who has teaching experience in both countries guesses that one reason may be seen in a different culture of presenting marks and feedback. In Switzerland publication of personal feedback information is less accepted than in Germany, especially the written one. Nevertheless the idea of ongoing evaluation and feedback seems to be quite worthwhile. Students rate their learning success as high to very high. The individual interviews approved that students think this comes from the feedback and the ongoing evaluation they received for their work.

Feedback and evaluation from the lectures to other students and groups works are by far not judged as good. Only 22% assessed it as raising their learning success and the majority valued it as rather discouraging. We conclude, that the new evaluation and rating system of K3 is a central success factor in raising the quality of teaching. But the feedback to others given through the publicity and transparency of all rating contributions in K3 is regarded critically and therefore not that helpful, if indeed helpful at all¹¹.

5.3 Feedback concerning the employment of the K3 system: communication behaviour and use of the system

This rather negative response concerning the assumed positive effects of public rating corresponds to an equally sceptical view concerning the transparent employment of the K3 system. The statement "contributions of other participants and groups raised my learning success" was denied by more than half of the participants, only one agreed and the rest was neutral. The feedback concerning the motivational aspects of the visibility of all entries in the K3 system delivers a similar picture. The majority judged it as not motivating. One participant noted that there was a fear in respect to mutual criticism. He explained that another student told him to refrain such actions, respectively to ask for permission before commenting a contribution. This annotation may help to resolve the reasons why an open self-supporting collaboration at the community level did not develop. Other clues, taken mainly from the interviews, indicate a) students did not find the time for open discussion, because of the high workload and b) even had no rational reason or intrinsic motivation to do work that is not explicitly specified. None of them had the time to start an intrinsically motivated discussion. Therefore the idea of initiating and boosting a broadened communication flow on the community level failed. Also the presumed positive effects concerning motivation and learning success in respect to a rather passive lurking and reading behaviour did not occur. If the additional transparency of the K3 system is not beneficial for the large part of the students, it has to be considered, if such an employment of K3 is worth doing at all.

5.4 Feedback concerning interuniversity cooperation

Students who took part in mixed groups – all students in Geneva and half of the participants in Constance – rated it as an useful personal experience to collaboratively work online with people they did not know in real life. These positive experiences seemed to outbalance the negative ones, especially a higher coordination effort. In the interviews students from Constance said that the interuniversity cooperation was nice to have but not a part of the course with outstanding importance.

¹¹ Data privacy concerns are not handled here and were neither a topic of the course, students did not utter doubts in this matter.

5.5 Feedback concerning the K3 software

Feedback concerning the usability and functionality of the K3 software itself was very basic. There was no complex and sophisticated inquiry, e.g. in form of a usability test. We asked for ease of use, orientation, and functionalities of K3.

The majority of the students had no handling troubles and judged K3 as easy to use. Half of the participants said that orientation within the system was difficult if the number of contributions in discussion grows beyond a certain threshold. This matches with the suggestions students made for further enhanced functionality. Most suggestions asked for a graphical visualization of the discourse structures. Students' feedback concerning the K3 software delivered valuable hints for the development of an optimised navigation system and a graphical visualization technique, which has been implemented in the meantime, shown in figure 7.

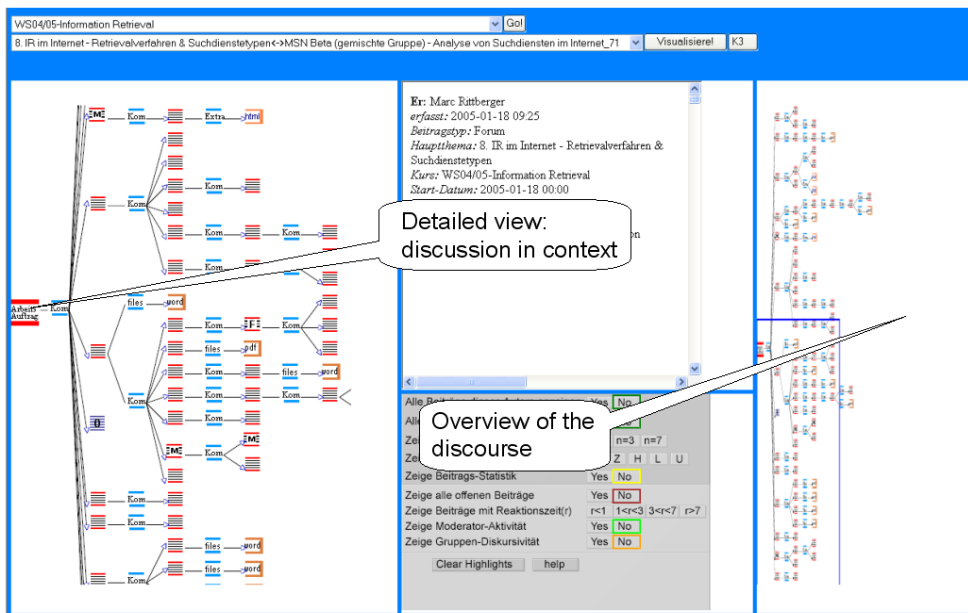


Figure 7: Visualization of K3 discourse, K3VIS

6. Conclusions

The results of the evaluation were encouraging. With respect to the small number of students and the singular character of many constituent factors of this special course the outcomes had to be taken carefully. But in sum the results indicate that the concept of the retrieval course was well accepted and motivating and most important: learning success was judged high. There were many suggestions that the quality of teaching and learning was raised through our implementation of the network approach of knowledge management.

The basic idea of K3 of combining different teaching methods was judged motivating and raising learning success. Instructional elements of traditional lecturing are still seen as an important part of learning. The employment of constructivist elements allowed us to boost communication and discourse between the participants on different collaboration levels.

- 1.) Collaboration on group level done with the help of clear cut group work orders were rated as the best single teaching method. There were intense discussions and the working results were of high to very high quality.
- 2.) Collaboration on community level could not be initialised as planned. Though the individual work itself is rated as a sensible teaching method and the individual virtual work seemed to be unproblematic for the students, a broader communication flow in the sense of an open self-supporting collaboration at the community level did not develop. The fact that there was no spontaneous additional virtual communication between the students from Constance and Geneva beyond the specified mixed group work illustrates this very well.
- 3.) Collaboration on the lecturer level was complex but effected in a raised quality, at least regarding the constructed teaching materials.

The ongoing evaluations, especially the comprehensive feedback for group and individual work can be connected substantially to the learning success, but comes with extensively additional expenses concerning the time spent for evaluation on the side of the lecturers.

The K3 system is judged as a suitable tool to realize collaborative knowledge management, and was the prerequisite to run the lecture in a dislocated way. But the idea of transparency and discourse openness of all entries, even the feedback contributions, was judged quite sceptical by the students. Furthermore the feedback of the students made clear that interuniversity cooperation in general and mixed group work orders in particular are nice to have but were not seen as a prerequisite for motivation and learning success. On the other side interuniversity cooperation embodies no basic handicap and the lecturers saw quite a lot of advantages in preparing the course and running a high-value lecture with K3¹².

7. Consequences & Requirements

Finally, what can we learn from this collaborative lecture in Information Retrieval for Students at universities in Germany and Switzerland for further investigations? What are the central consequences and requirements?

First of all it is important to keep in mind the research character and context of the course. It is not a stand-alone investigation but rather an experiment that grounds on and is built of many preceding experiences in the K3 project. K3 tries to enhance the quality of learning and teaching primarily by boosting communication and discourse in knowledge production processes. In respect to the three collaboration levels the consequences are:

Group level: Collaboration on group level is very successful and often leads to intense virtual discussions. As mentioned in 5.5. there is a danger that the participants loose orientation, if the number of contributions grows beyond a certain threshold. That indicates that presently available standard orientation means were insufficient. To counter these negative effects and to alleviate collaborative knowledge building processes new concepts for semantically structuring communication processes or new visualization techniques may help to ease orientation in the system. Therefore we developed K3Vis, a visualization component, a role system, and typed discourse objects. These new components need to be evaluated in real life lectures.

¹² Although not utterly asked for, students stated multiply that the lecture was structured very well and that the teaching material was readable and meaningful.

Community level: Collaboration on community level was rather sparse. Although the costs of giving feedback to students' contributions were very high for the lecturers the intended goal of initiating self-supporting discussions was not achieved. Therefore it seems rather unlikely that the actual peculiarities of this concept could and should be transferred and durably established in "everyday life" lectures. There are two different ways to solve this problem.

- 1) First, to further refine the concept of individual virtual work by:
 - a) Making it an optional not a compulsory didactic element of courses.
 - b) Reducing the cost of evaluation on the side of the lecturers, for example by employing a system of peer reviewing and grading by the students themselves [Shen, Kung-E, et al. 2004].
- 2) Second, to finally abandon the concept of individual work and concentrate on the application of group work.

Lecturer level: The idea of collaboration of the lecturers was a new element of this course. The goal was to enhance the quality of teaching by expanding the concept of collaboration to the organization of the lecture. It effected in a raised quality of the teaching materials. The conjointly operated parts of the course demanded a quite large coordination effort. Because collaboration of lecturers from different universities is an open research field, this collaborative retrieval course served as a starting point for a new research project in Germany. We asked for funding to establish a combined system of higher education in Information Science in German speaking countries. We will realize a curricular network of different universities through coordination and collaboration of different lecturers¹³.

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¹³ Project draft (in German only) „Kollaboratives Wissensmanagement in der informationswissenschaftlichen Hochschulausbildung“. Available at http://www.inf-wiss.uni-constance.de/People/RK/Download0305/gesamtantrag_version300904_13-00.pdf.

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