Student-Centered eLearning (SCeL): Concept and application in a students' project on supporting learning

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Abstract:

According to advanced didactic and psychological theories such as the Student-Centered Approach by Carl Rogers, real learning should not be constrained to enlarge the students' supply of knowledge structures, but should equally address personal and social growth. This kind of learning requires the facilitator not only to follow the curriculum's requirements, but also to strive for understanding the students' meanings and feelings and to provide a transparent, open, and respectful learning climate in which students can work on real problems they wish to resolve personally. Recently, we complemented the Student-Centered Approach by elements of eLearning (SCeL), claiming to multiply the advantages of both constituents. In this paper, we characterize our current practice and understanding of SCeL in general and discuss our experiences with this approach in a group project performed in a lab-course on 'Requirements Engineering and Web-design', where we employed the communities version of the TeleWIFI eLearning platform.

1 Introduction

In the preceding term a group project in the context of a lab-course in 'Requirements Engineering and Web-Design'[1] was performed to deepen and diversify the authors' positive experiences with combining Student-Centered Teaching with using the Internet for learning[2]. The diversification proceeds along two dimensions. Regarding the didactic approach, we stayed with Student-Centered Teaching as developed by the well-known American psychologist Carl Rogers [17, 19], but varied from having students solve individual projects in small groups of 3-4 people to introducing one common major project on which students cooperated in small groups. Along the technical dimension we switched from using a self-designed web-archive for students' projects to employing the community version of the TeleWIFI[3] eLearning platform.

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[1] The course has duration of 2h per week per semester. A prerequisite for this advanced course is the completion of a basic course on software engineering.
[2] compare last year's contribution to the ICL [11]
[3] We express our sincere thanks to Paul Tavolato and Michaela Pum who provided us with this opportunity and constant consultation and support. We further thank WIFI Österreich/WIFI Netzwerk for supporting the development of the TeleWIFI system.

In a nutshell, the Student-Centered approach is based on the hypothesis that students who are given the freedom to explore areas based on their personal interests, and who are accompanied in their striving for solutions by a supportive, understanding facilitator not only achieve higher academic results but also grow with respect to their personal values, such as flexibility and self-confidence [1, 17, 19]. This approach is also known as experiential learning [16]. It aims at involving the whole person, his or her intellect, feelings, intuitions, meanings, goals, social skills, practical skills, involvement in learning communities, etc. Recent research and educational policy in the US and the European Union strongly support this whole-person view on learning since it appears to be better suited to cultivate life-long learners who can more appropriately cope with the complex and unpredictable problems of today' world [5]. Experiential learning requires specific personal attitudes on the side of the instructor who takes over the role of a facilitator. These attitudes are highly transparent open communication, respect towards students and the striving for deep understanding of students [16, 19].

While the benefits of the "pure" student-centered approach have been proved in numerous case-studies and are well-documented in the literature [1, 17, 19], its combination with elements of eLearning is a novel asset [11, 12, 13, 14]. Briefly, the combination is such that major parts of the transfer of cognitive knowledge are allocated to the computer. This leaves more room for social interaction [2], knowledge construction [10], and personal insights/growth in the face-to-face phases [4].

The next section reviews the characteristics of Student-Centered Teaching and its enrichment by elements of eLearning. In Section 3 we discuss our concrete course design and experience in a group project on designing a prototype system that optimally supports students in business informatics ('Wirtschaftsinformatik') in their studies. This Section includes some hints on SCeL practices, describes our experience with the TeleWIFI Communities platform and deals with students' reactions. In the forth Section we draw some general conclusions and give an outlook on further research.

2 The psychology and technology of Student-Centered eLearning

2.1 Characteristics and goals of Student-Centered Teaching

Student-Centered teaching can be characterized by the following goals. It aims toward:

- a participatory mode in all aspects of learning and decision-making;
- a climate of trust in which curiosity and the natural desire to learn can be nourished and enhanced;
- helping students to achieve results they appreciate and consider worthwhile, to build their self-esteem and confidence, while, at the same time, keeping to the curriculum;
- uncovering the excitement in self-initiated discovery, which leads students to become life-long learners;
- developing in teachers the attitudes of realness, authenticity or transparency; acceptance or respect and empathic understanding that research has shown to be most effective in facilitating learning;
- helping teachers to grow as persons finding rich satisfaction in their interactions with learners.

[17, p. 3 adapted, shortened]

The Student-Centered Approach to teaching and learning is one of the derived theories of Carl Rogers' (1902 – 1987) Theory of Personality and Behavior [15]. The only basic assumption

of this theory is that human beings, like all living organisms, strive to maintain, actualize, and enhance their experiencing organisms. Rogers calls the single and unique source of motivation *the actualizing tendency* and derives from it the conclusion that human beings are constructive in nature. He then devoted his lifetime to researching the necessary and sufficient conditions under which this constructiveness can best become effective. In working with children and as a counselor and psychotherapist he found that personal growth unfolds itself best, if the facilitator (e.g. counselor, teacher, therapist, parent, etc.) holds three attitudinal conditions: Congruence (also called realness, genuineness, transparency, authenticity, openness), acceptance (also respect or unconditional positive regard), and empathic understanding (a deep understanding for the feelings and meaning of the respective person), and if the other person perceives them, at least to some degree [15, 16, 18].

Rogers himself taught several courses at various universities in the U.S.A and coined the term experiential-, or whole person learning to refer to the effects of his style of "teaching" which he described in several articles and one book [17]. All these references describe Rogers' and his colleagues' practical experiences along with detailed reactions from the students' point of view [e.g., 18].

Consequent research in the Student-Centered Approach proved [1, 19] that students achieve superior results along with personal growth in terms of higher self-confidence, openness to experience, self-respect, and respect towards others and their environment, etc., if they learn in an atmosphere or climate that can be characterized by three basic attitudinal conditions[4]: congruence, acceptance, and empathic understanding. These necessary and sufficient conditions must be held or lived by the instructor, better facilitator, and reciprocally need to be perceived by the students. While this may sound easy, concrete situations often are challenging such that beginners will find themselves in situations that make it hard to find the right proportion among the three attitudinal conditions. How to deal with a situation where a scheduled presenter of essential material does not show up in time or another group is about to use much more time for their presentation than scheduled? Student-Centered courses depend not only on the instructor's plans but, due to their participatory mode and responsibilities bear in themselves the unexpected, the chance to learn from situations in the "here and now", and require a large amount of internal flexibility on the side of both facilitator and students. Consequently, personal and social skills as well as experience from the facilitator have significant influence on the students' learnings. More than in any other approach the personal style of the facilitator, however, will be influential in the implementation of Student-Centered Teaching.

Furthermore, in our own experience, Student-Centered Teaching requires at least a certain degree of openness of the curriculum and both willingness and time of the facilitator to offer choices and to structure the process of learning [3, 9, 11]. Since our students tend not to be used to too much freedom in their studies, the provision of sufficient freedom without letting students get lost in excessive chaos is a key issue.

Below we list some of he characteristics that have proven essential in our conduct of the Student-Centered Approach. We hope they provide some inspiration, in which way so ever, to the reader.

- The teacher takes over the role of a facilitator holding the three *attitudinal conditions.*

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[4] These conditions are also called the three Rogers variables. Although they are described separately, they depend on each other such that they "flow into a congruent whole". Their proper combination in any situation is essential for a Person-Centered climate.

- Students and faculty *share* the *responsibility* of meeting *curriculum requirements*.
- Students *participate* in all aspects of learning and decision making, for example in supplying material, tackling problems, in fine-tuning a course's contents, learning strategies, evaluation procedures, etc.
- Students perceive *authentic problems* they wish to resolve personally or in small teams [9, 3].
- Students are free to suggest or to choose topics, aspects, processes within the context preset by the curriculum.
- *Learning* takes on *several dimensions*. It proceeds both individually and cooperatively in small teams and the large group, along the content- as well as the process dimension, and cognitively as well as socially and personally, intuitively or emotionally.
- Students may use the facilitator as a resource, ask for his or her experience in the field, for his or her opinion, ask him/her to lecture, etc.
- Conventional elements have their place if this is what the group decides.
- Students participate in the evaluation of learning.

Another important humanistic principle should join the list:

- Everybody is heard, everybody's resources as well as limitations are taken into account.

It is only fair to mention that although we try hard, we have not fully succeeded in realizing this principle. This is evident from the evaluation sheets which show a large majority of highly satisfied students but a few (10-15%) who seem confused and feel uncomfortable with the approach. In any case, we continue to approach the "everybody is heard" principle as closely as we can in the light of the limited resources we have at our disposal.

2.2   SCeL: Combining Student-Centered teaching with eLearning

Although research has proved that Student-Centered classrooms lead to an increase in personal and social qualities and tend to improve academic achievement [1, 19], they appear to be costly in terms of the facilitator's time. The old rule: prepare once and use several times simply does not apply if students are to participate in all aspects of learning. Clearly, focusing on the needs of the individual or small group as well as on the class as a whole and, at the same time share the responsibility of meeting the requirements preset by the curriculum requires inner flexibility and, first of all, time. This means: time to think, to communicate, to structure and organize contributions, in order to make them effective for the whole group, to provide special material, and, initially, time to acquire the skills necessary to shift from being a good instructor to becoming a good facilitator of learning [17]. While we postpone the discussion of the latter aspect to Section 4 let us see in which ways New Media can help in reducing some of the overhead caused by facilitating the Student-Centered style of learning.

- **Provision of resources via the Internet or the eLearning environment.** Lecture notes, reading lists, links to professional web-sites and project homepages can be made available electronically. The material can be uploaded and updated whenever deemed necessary. Students can contribute to searching material and making it available for the whole group, optionally with comments on contents, quality, and/or availability. This saves some of the facilitator's time for dealing with versions, organizing copies, searching material for individual purposes, and the distribution of material. In the case that all resources are well organized in one place, all participants can appreciate the flexible availability of material around the clock and independent of a physical location.

- **Internet as knowledge source.** Computer Science students in particular and other students[5] in general can use the Internet for explorative, open learning [7, 8]. This learning paradigm is particularly suited to the Student-Centered Approach since students are free to explore the semantic web and can cooperate in fulfilling their purposes.

- **Course-Homepage.** Locality of all organizational/structural information regarding the whole course as well as the provision of organizational information on individual course units makes communication more efficient in the case that students regularly read that information.

- **Communication and participation.** The Student-Centered Approach with its orientation towards the students' interests and participation in all aspects of learning necessitates intensive communication between all concerned [20]. In this respect, a learning environment provides adequate means (discussion forum, students' workspaces, blackboards, whiteboards, etc.) to facilitate and to focus communication. Results from project work and from face to face meetings can be distributed easily by individual participants with just minimal involvement of the facilitator. Also, student tutors can help to answer and/or screen questions and help to save the facilitator's time.

- **Evaluation.** In lab-courses, continuous cooperation and web-based self- and peer evaluation make final tests and exams superfluous.

- **Templates for Student-Centered eLearning elements.** We are developing web-templates to provide effective organizational support for characteristic, application independent patterns of SCeL elements [6].

From our experience it is appears that SCeL courses still take more of the facilitator's time than conventional ones but the overhead, in our case, is clearly outweighed by the intellectual, social, and personal gains of the respective courses. Moreover, we conjecture that increased experience with the new style will reduce some further fraction of the overhead[6].

Some of the benefits of SCeL we experienced so far are the following:

- A rich choice of material can be made available to all quite easily.
- The Internet can be used for exploratory learning such that students search for material and choose and comment on resources they find most useful.
- Group workspaces for small teams can be provided such that students working in small groups can exchange and update documents independent of time and location.
- Knowledge can be constructed incrementally, both in face-to-face and online phases.
- In the case that the computer takes over essential parts of the transfer of intellectual knowledge, time can be spent to learn from the different and overlapping viewpoints of peers. Thus, social and personal learning are facilitated.
- Students who feel respected and understood tend to be more open, cooperative, constructive, acceptant and responsible themselves.

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[5] Our experience is constrained to working with rather advanced students. Beginners may need some support in effectively searching the Internet.

[6] Unfortunately, we cannot give quantitative data on the amount of overhead in SCeL courses since we conduct many of them as case studies to which we devote more time and effort than would be necessary otherwise.

- Students can learn from multiple examples rather than just from a single one. This can be achieved if all documents delivered from students and corresponding comments from instructors and/or tutors are made publicly available in respective workspaces.
- Various and individual proofs of learning are a lot more feasible. Also, mixed modes of evaluation including self- peer- and instructor's evaluation are quite easy to adopt.
- Students who tend to be quiet and less expressive in face-to-face discussions often participate more actively in online activities that give them time to think before responding.
- Students tend to be more active taking on different roles, such as document author, team mate, coordinator, enquirer, evaluator, recorder, etc.

3   Course design and experiences

3.1   The project and the process

The concrete, authentic problem proposed in the context of the recent advanced course on 'Requirements Engineering and Web-Design' was to develop a prototype of a web-application called WINlearn (Wirtschafts-INformatik lernen) intended to support students of business informatics in several aspects and circumstances of learning in a very broad sense. Our lab-course project involved 26 advanced students working in 8 teams of three to four students. Quite surprisingly in this course no single student quit prematurely. Technically, we used the simple community version of the TeleWIFI eLearning platform. From the organizational point of view, one student tutor was available in the lab for 2 hours per week. His task was to help students with technical problems and to support the facilitator (first author) regarding communication with students (such as keeping deadlines and publishing project milestones on the platform) and the platform providers. Didactically, learning was intended to proceed on three levels: Cognitively, participants were expected to learn to collect requirements according to various techniques and to design and implement a prototype of the WINlearn application that shall meet basic criteria of usability. Ideally, the constructors should use the resulting system to ease their further studies. Socially, students should experience the relationships between working/discussing in small groups and in the large group and should sense the difference between online and face-to face communication. On a personal level, students should perceive their constructive capabilities while working in a supportive atmosphere where they feel received, gain self-confidence, and catch up some of the interpersonal values constituting this supportive environment.

In some more detail, the task the facilitator suggested was to cooperatively develop a prototype web-application WINlearn that, from the students' point of view would support them optimally in all aspects of their study of business informatics. The majority of students immediately came to like this project proposal. One team of students would have preferred a different topic, one team was quite undecided, but both joined in as they saw that throughout the course the major common project was going to be WINlearn. Also they felt that following their own project proposals they would play subordinate roles only. Anyway, the choice has been theirs.

The students have been informed that an eLearning platform will be available, but, due to organizational issues, unfortunately only from the fourth week of the course on. Thus, the course was conducted as a presence course in our lab with heavy use of the eLearning platform for the provision of material and for communication purposes between the presence phases and with explicit discussions on the benefits and shortcomings of the platform during almost every course unit. The students have been advised to put all documents and presentations they prepare for the course onto the TeleWIFI platform. For this purpose, each

small team had its own workspace. Although the simplicity of the community version did not allow us to protect the individual workspaces from being changed from users other than team members, we did not experience any single attempt to modify a team's documents from users other than team members.

Besides the eLearning platform, the independent existence of several other web-based applications should be taken into account, such as the department's homepages, the business informatics curriculum homepage, and, most importantly, the administrative system ISWI (Informationssystem Wirtschaftsinformatik) holding all administrative information on entities such as courses, lecturers, students, exams, and reports.

We started by collecting system requirements employing the different requirements elicitation techniques discussed in the concurrent lecture. We chose 4 techniques (use-cases, domain analysis using class diagrams, goal analysis, and capture of non-functional requirements) and teams were free to choose whatever technique they preferred with the facilitator's wish that preferably all techniques be covered such that 2 teams independently use the same technique. The following presence phases were used to present and to compare individual results, to discuss the various viewpoints and finally to consolidate the requirements and assign priorities to them. The facilitator said she wishes the teams to organize their presentations such that, over the term, there is an approximately balanced contribution of individual team members such that the oral contributions can be assessed without further exams. Students willingly followed this pattern although they were occasionally weak in commenting on other teams' contributions. However, most of the time we had real discussion on what the system should accomplish and how we should realize it. The most heated discussion arouse over the issue of the initial system's portal, where advantages and disadvantages of data- versus function-oriented designs were exchanged. Finally, a very simple, function-oriented proposal that made it possible to subscribe to certain services won the race.

While students smoothly assigned themselves to individual tasks and succeeded in responsibly working on well defined tasks such as eliciting requirements according to a special technique, consolidating requirements with a partner team, finding out about navigation strategies and presenting this to the group, working on a proposal of structuring TeleWIFI's forum and media section, etc. putting together the results was perceived as difficult by all concerned. One problem was that students tended to upload their contributions right before the course such that often it was hard for the facilitator to plan the integration phase. This left us with the only option to deal with integration in an ad hoc way which occasionally caused some confusion and was driven by the facilitator more strongly than initially intended. Some results from the integration efforts on the requirements and the overall design of WINlearn are given in the next section.
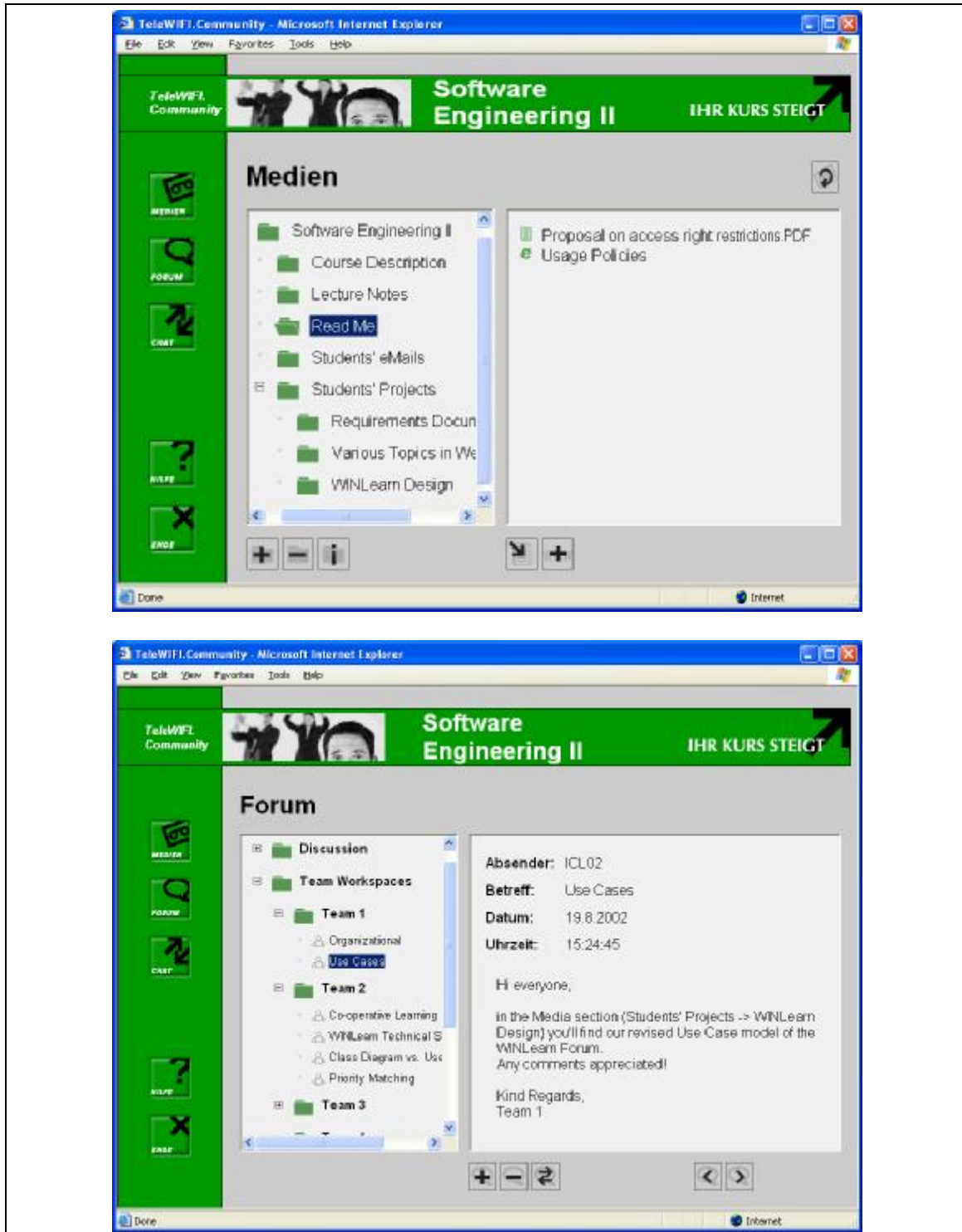
3.2   Some results

Adapting the platform for use. We were kindly offered to use and concurrently test the first version of the TeleWIFI Communities platform, a simple version of the much more elaborated full TeleWIFI system. TeleWIFI Communities offer community access (by entering user and password) to three sections: Media, Forum and Chat[7]. While the Media section is intended as a repository of various material and media, the Forum's primary focus is on supporting structured online discussion. Both sections provide hierarchic directory structures. Since in our version of TeleWIFI Communities all members of the community had equal read and write access rights to all directories[8], our first task was to come up with a

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[7] Since we did not use the Chat facility, the following description is constrained to „Media" and „Forum".
[8] Note that the directory structure of the Forum section must be built and maintained by an authorized user.

suitable directory structure and corresponding access policies. The structure we used is depicted in Figure 1. Although a detailed document on access policies and a proposal on access right restrictions on individual sections has been worked out, in this place we just mentioned that we agreed not to delete or modify files uploaded by others, to introduce team workspaces where all had read access but only team members were supposed to maintain files, and to use the Media section for lecture notes and final versions of documents while using the Forum for intermediate version intended to be discussed.
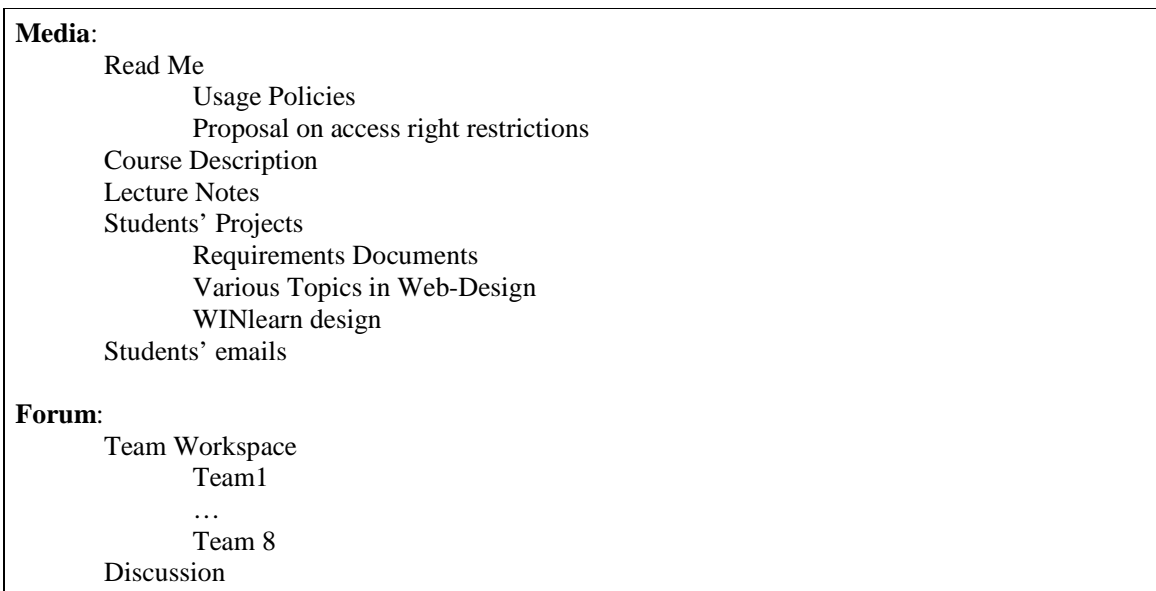
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Media:
        Read Me
                Usage Policies
                Proposal on access right restrictions
        Course Description
        Lecture Notes
        Students' Projects
                Requirements Documents
                Various Topics in Web-Design
                WINlearn design
        Students' emails

Forum:
        Team Workspace
                Team1
                …
                Team 8
        Discussion
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Figure 1: Basic structure of the Media and Forum sections used in the course on Requirements Engineering and Web-Design. The first part gives the TeleWIFI structures; the second part shows a more complete textual transcript.

Requirements. The consolidated list of requirements, put together by the facilitator and complemented in a successive meeting is given in Figure 2. The catalogue is given in full length since we find the variety of issues really remarkable and hope that readers may get some inspiration from it. Figure 3 shows a goal hierarchy for WINlearn.

As for the WINlearn prototype, we made up our minds to build it on top of TeleWIFI Communities by designing one community ("WIINF" for WIrtschaftsINformatik) with general information, intended to be joined by each student of business informatics. Then, each course or course cluster using elements of eLearning should provide its own community. The proposals for the generic directory structures for the WIINF community and for the individual course's communities are given in Figures 4 and 5, respectively. In general, in the end of the course the WINlearn prototype system came to be less mature in terms of graphic and page design than intended but its scope and functionality by far exceeded the facilitator's expectations. The current state of issues is that one of the students indicated deep interest in completing the WINlearn application as part of his Masters Thesis in the coming term, thus building upon the rich experience in the group project. We are curious about the final outcome.

Supply of information:
        Collection of links to related sources and systems
        Links to other universities offering courses for exchange (e.g. TU-Wien)
        Contacts to student counselors
        Information about students: structured and free information
        Happenings, presentations, talks,
        Descriptions of courses from the students' point of view

Materials: (* these were allocated to be part of the eLearning platform later)
        EContent, possibly in multi-media form,
        Lecture notes, assignments and workouts, old tests and exams including solutions

Exchange of information:
        Organized chats, e.g. with experts, visitors
        Various discussions forums regarding trans-disciplinary and other topics

Markets: (Trading "Börse")
        Lecture notes, books
        Jobs, student tutors, student assistants
        Masters Theses, offers of practical work experience ("Praktika")

Cooperative learning:
        Students help students
        Paid support
        Training and preparation for exams (with staff)
        Learning groups for exams
        "Who of my buddies is online?"

Organizational issues:
        Schedule, individual time planner
        Alert on changes
        Exchange programs with other universities and corresponding hints

News:
        Changes, cancellations, happenings, other news

Supplementary requirements:
Evaluation of contributions, personalization, subscription to services, protection to flooding with excessive information, login – access, protected areas, transparency, cost-effectiveness, maintenance by designated students, up-to-date information.

Figure 2: Structured catalogue of functional requirements of WINlearn.

G1 Optimize electronic support for business informatics studies
G2 Accelerate business informatics studies
G3 Provide information relevant to studies
G4 Make organizational aspects easier
G5 Provide support in finding contacts
G6 Improve learning support
G7 Save time
G8 Allow for timely and notable notifications
G9 Provide list of current exams
G10 Support contacting professors, lectors, and tutors
G11 Provide connections to the field of economy
G12 Support job mediation
G13 Provide lecture notes and catalog of past exams
G14 Increase study achievements
G15 Support building of curricula
G16 Mediation of master theses
G17 Mediation of learning partnerships
G18 Allow for contacting other students
G19 Provide interactive learning material
G20 Provide for planning of interactive learning

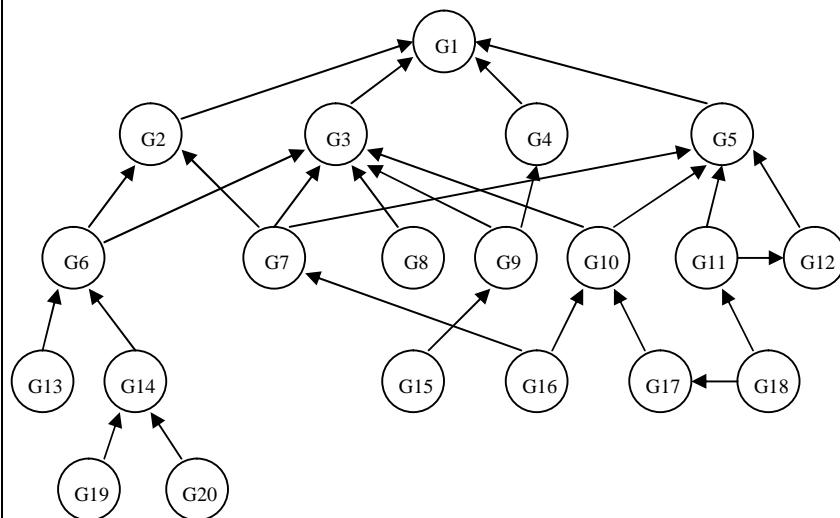**Figure 3:** Sample goal analysis document

Proposal for the structure of the community "WIINF" encompassing all students of business informatics

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Media:
        Community Rules
        Community Members (data structure with fixed and variable fields)
            Staff, tutors, students
        Hints and Frequently Asked Questions
        Jobs
        Masters Theses
        Topics for Practical Courses

Forum:
        Study of Business Informatics
        News, Reports
        1st Segment of Study
        2nd Segment of Study
        PhD Study
        Baccalaureate
        Transition to Baccalaureate
        Related Issues and Enterprises
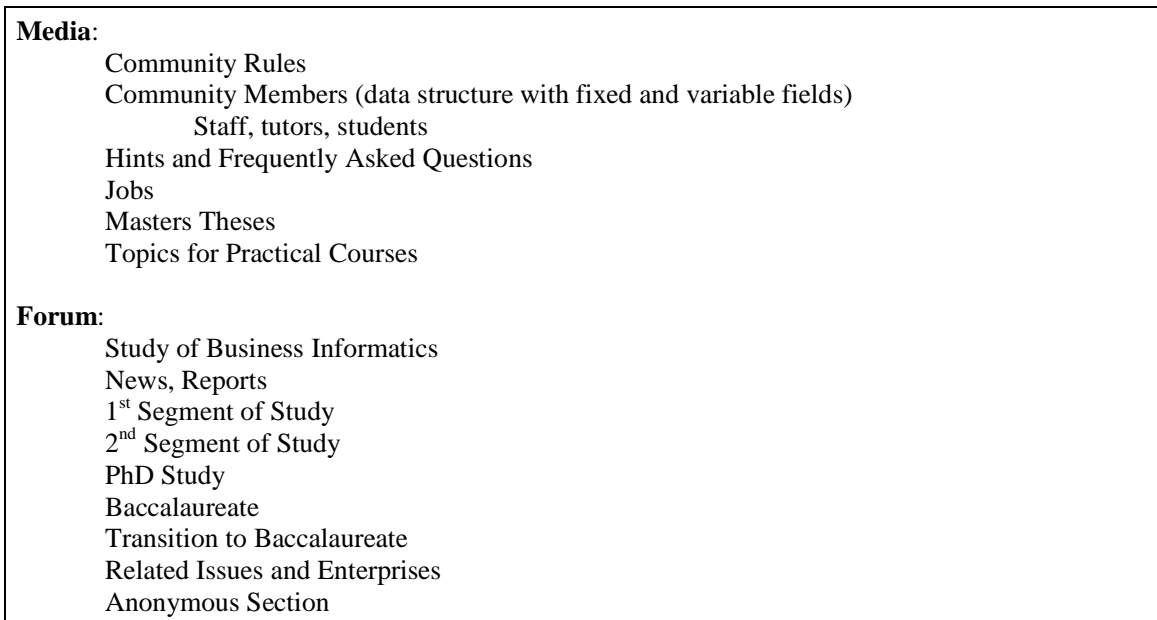   Anonymous Section

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Figure 4: WINlearn design: proposal of a general structure for the WIINF community

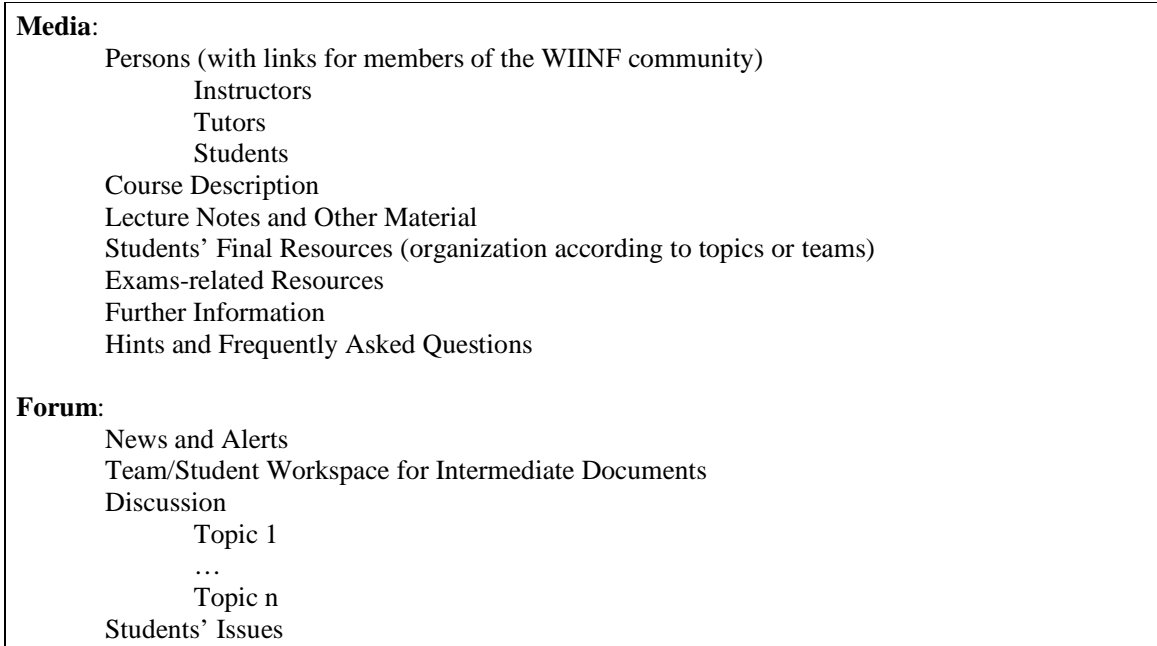*Proposal for the core structure of communities for individual courses*

Media:
        Persons (with links for members of the WIINF community)
            Instructors
            Tutors
            Students
        Course Description
        Lecture Notes and Other Material
        Students' Final Resources (organization according to topics or teams)
        Exams-related Resources
        Further Information
        Hints and Frequently Asked Questions

Forum:
        News and Alerts
        Team/Student Workspace for Intermediate Documents
        Discussion
            Topic 1
            …
            Topic n
        Students' Issues

Figure 5: WINlearn design: proposal of a general structure for each course's community
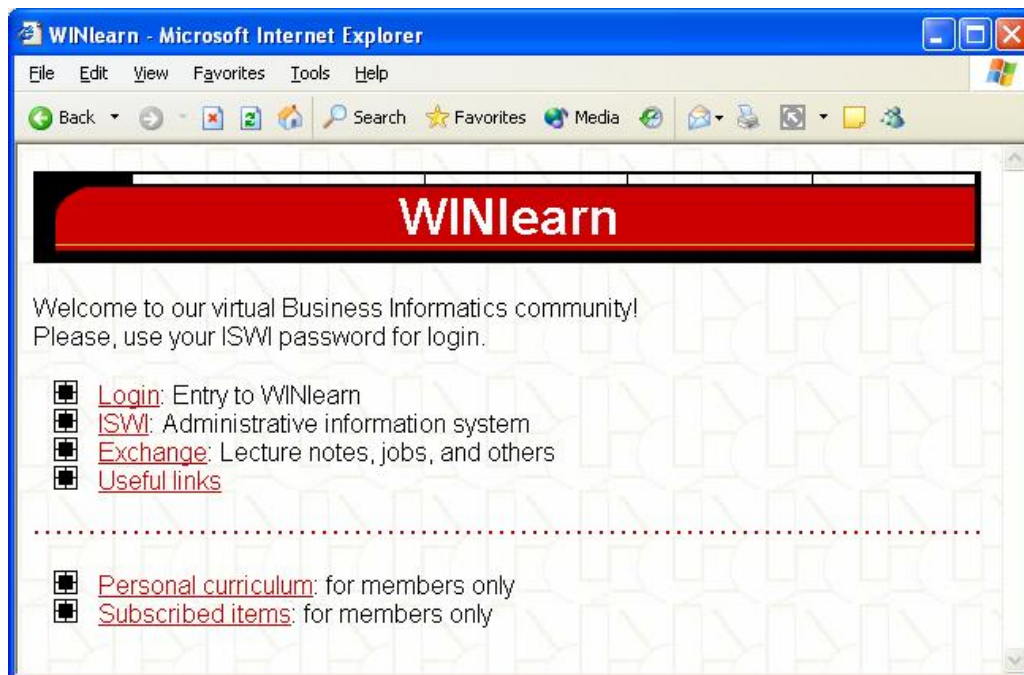
Figure 6: WINlearn portal

3.3   Some comments on TeleWIFI Communities

Firstly, TeleWIFI Communities were extremely simple to use. This was a particular advantage in our case since the platform was introduced in the forth week of the course only and everybody could work with it immediately after a brief (15 min) introduction. Students found it particularly easy to download lecture notes and to upload their files that existed in various formats. It is remarkable, that students used the system in a very responsible way and no single file got ever overwritten despite the lack of protection mechanisms in the simplified version we used. One reason may be our particular care to work out policies on how to cooperate in our community and the respective transparent structure we provided for organizing our files. Nevertheless, the facilitator had mixed feelings about putting her lecture notes into an area that was totally unprotected. She found some relief in providing the lecture notes concurrently via the protected scripts section of the department homepage. This is to say that a protected area in the Media section of TeleWIFI Communities or the provision of means to protect areas would be appreciated. While saving is supported, a function to easily restore the whole archive would largely improve data protection and robustness.

Simplicity being a very strong point in the context of TeleWIFI Communities, functionality and "look and feel" are somewhat compromised. For example, we missed the option to order entries according to their importance or chronology. TeleWIFI Communities forces alphabetic order which we found confusing since items had to be searched by their names. Also, it is not possible to use icons and each folder has the same color such that no visual hints are provided for orientation. We found the hierarchic structure of the Forum excellent, but were less satisfied with the display of individual messages and the handling of attachments which, in our view, lacks transparency. The students, much more than the facilitator, would have preferred a more transparent discussion forum.

Throughout the course we were impressed by the prompt and excellent support of the TeleWIFI Communities providers. Whenever we had problems such as interpreting an error

message or deleting files or simply wanted additional information, their response came immediately, we learned about workarounds, and problems were repaired immediately.

3.4 Students' reactions

- Students appreciate having choices regarding the problems they are supposed to resolve. In particular, they like to tackle real problems and invest more efforts into tasks that concern them personally.

- Most students finally like to work in small teams since they can complement one another. They mention that they need some time in the beginning to come to terms and share responsibilities but that working in teams, in general, is more rewarding than working on their owns.

- Students are willing to make contributions on a voluntary basis throughout the term in the case that they know that this will potentially substitute a formal test or exam.

- Students catch up attitudes on the fly. They appear more responsible, cooperative, and even constructive in the case that they perceive being trusted and respected.

- Students tend to prefer the Student-Centered style in the case that both, the latter and the conventional style, are explained. Last year 31 students were asked to rank the Student-Centered and the conventional style in a questionnaire handed out at the beginning of the term [11]. On a scale where 1 is best and 5 is worst the average grade for the Student-Centered style was 1.69 whereas the conventional style was ranked with 3.44. This year, the facilitator asked students on completion of their introductory course on software engineering whether they would be willing to try SCeL in the coming term. All teams nodded unanimously, indicating their preference for the innovative style.

- Students working in teams tend to deliver project diaries per team despite a clear indication that a personal project diary is expected.

- Students find it difficult to evaluate themselves.

- Most students are quite aware of a more diffuse style of learning in Student-Centered group projects. Most of them appreciate this unique opportunity of social learning and acknowledge that it has a different quality to conventional learning, most probably a quality that will be more useful in their careers than fact learning. Nevertheless, some students would have preferred to acquire more consolidated knowledge they could apply as a resource in future projects.

4 Conclusion

The group project on designing a prototype of a web-application WINlearn to support business informatics students in all aspects related to learning strongly confirmed our positive experiences with the Student-Centered Approach and its particular facilitation and enrichment by the use of eLearning technology. The latter can be employed such that some of the overhead of the Student-Centered style can be reduced, in particular, if student tutors support individual communication and help in maintaining the data on the platform. A particular advantage is that students can learn not only from their own project work but equally from

their peers' contributions that are publicly available in all versions and with all comments. Although students of business informatics tend to prefer more sophisticated eLearning tools they can adopt for their specific purposes, the very simple TeleWIFI Communities platform provided, in a highly time effective way, all the support we needed to make this course a valuable (e)learning experience for all contributors.

Further research addresses various directions. One line of research deals with an increasingly stronger integration of eLearning elements with the Student-Centered approach. In order to further facilitate communication and organization of SCeL courses, we are mining general patterns of SCeL practices, in order to model them conceptually and support them with prefabricated web-templates [6]. Another line of research investigates the applicability of structuring principles from the area of knowledge representation to the structuring of eContent. Further, we aim to gain yet more experience with our, from our point of view, highly rewarding style. Thus, we plan further case studies, not only in the area of business informatics but also in other areas such as medicine, medical informatics and psychology [13].

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