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To cite this version:

Philipp Budka, Elke Mader, Johann Stockinger, Katrin Prilisauer, Elisabeth Anderl. Interactive computer aided learning in social science education: strategies, scenarios, tools, and evaluations of an e-learning environment at the Department of Social and Cultural Anthropology of the University of Vienna. Conference ICL2007, September 26 -28, 2007, 2007, Villach, Austria. 12 p. hal-00197264

HAL Id: hal-00197264

https://telearn.hal.science/hal-00197264v1

Submitted on 14 Dec 2007

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Interactive computer aided learning in social science education: strategies, scenarios, tools, and evaluations of an e-learning environment at the Department of Social and Cultural Anthropology of the University of Vienna.

Philipp Budka[1], Elke Mader[2], Johann Stockinger[3], Katrin Prilisauer[4] and Elisabeth Anderl[5]

University of Vienna_1, University of Vienna_2, University of Vienna_3, Vienna University of Technology_4, University of Vienna_5

Key words: *blended learning, evaluation, social science education*

Abstract:

This paper presents the e-learning project "Strategies for Networked Learning" at the Department of Social and Cultural Anthropology of the University of Vienna, its structure, objectives and technological infrastructure. Furthermore, it discusses a blended learning case study and the selected results of an evaluation of blended learning courses conducted within the project. As these evaluations indicate, blended learning scenarios need to be very well planned and evaluated by considering the format of the course and the divergent experiences of students and teachers alike. In addition, blended learning requires the systematic integration of online phases into face-to-face periods in form and content, transparency in student-teacher interaction as well as continuous student support during the online phases.

1 Strategies for Networked Learning

Within this paper we present a case study in blended learning, which intends to identify the changing attitudes of advanced social- and cultural anthropology students at the University of Vienna towards several e-learning concepts, tools, and methods. In addition, we take a look at the bigger picture of e-learning in the social sciences by discussing selected results of an evaluation that was conducted with more than 300 students. This shall contribute to a better understanding of the students' experiences, uses, attitudes, and acquired competences in the field of e-learning and blended learning respectively. Both surveys were conducted within the scope of an e-learning project at the Department of Social and Cultural Anthropology of the University of Vienna, which will be introduced in the following section.

The e-learning project "Strategies for Networked Learning" (http://www.univie.ac.at/ksa/e-learning) aims to develop strategies to include selected e-learning tools, methods, and technologies in the most useful and efficient way into the teaching and learning practices of undergraduate social anthropology students at the Faculty of Social Sciences of the University of Vienna. To achieve this objective, an e-learning environment has been created, which comprises different learning tools:

- an open and free to use web-based hypermedia content pool (CP), which contains interconnected learning units that are produced by a team of teachers/authors of the Department of Social and Cultural Anthropology,
- the official e-learning platform of the University of Vienna: *WebCT Vista* (since Summer 2007 *Blackboard Vista*), and
- selected wiki systems, which allow for collaborative learning and knowledge production.

These instruments are used by teachers in different combination to construct various blended learning scenarios, meaning in the context of e-learning the expedient mixture of face-to-face and online phases in education (e.g. Lorenz et al. 2004).

Since most of the teachers had no or only little experience with producing learning material for the World Wide Web, they were introduced to a special authoring tool, which was already used and successfully evaluated in previous e-learning projects (e.g. Budka et al. 2005, Mader et al. 2004). This tool – the *MindManager Pro6* – allows for the creation of mindmaps, which enhances creativity and enables the construction of hierarchical structures in a highly visual format. Additionally, authors are able to connect text modules and textual elements to a hypertextual structure, without necessarily knowing HTML.

1.1 Technological Infrastructure

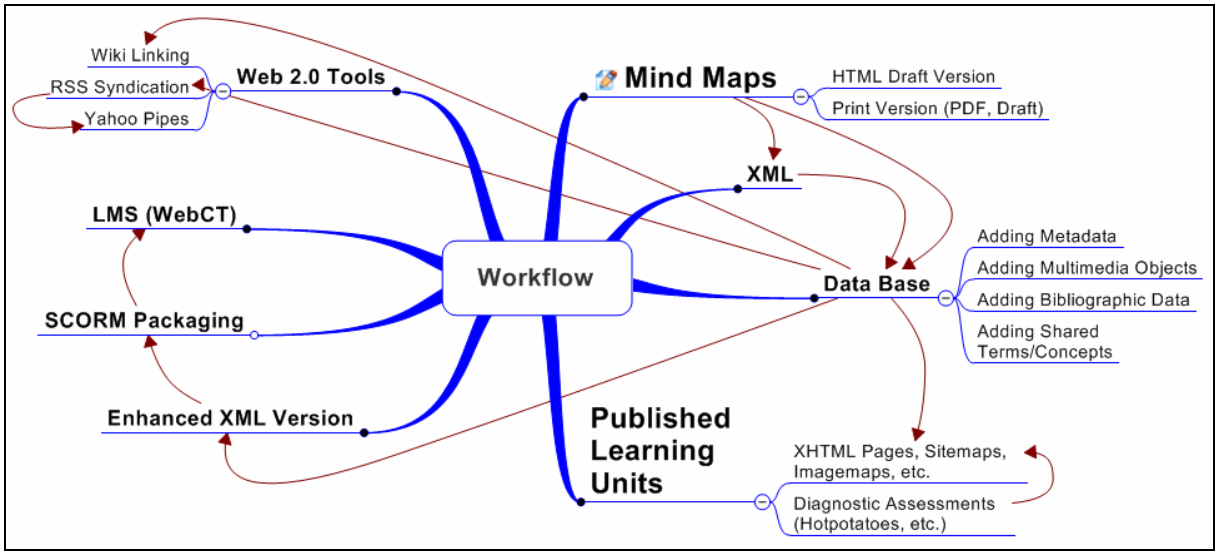

Figure 1: Workflow and possible add-ons

The *MindManager* authoring tool provides a hypertext structure that enables the authors to produce HTML prototypes of the learning units and test them before being definitely integrated into the e-learning environment. Thus, the content can be evaluated and refined at various stages of production without special effort. Furthermore a RTF export function allows the user to create traditional course scripts (e.g. PDF or DOC documents) according to the book metaphor.

In a next step the learning units are exported to XML (Extensible Markup Language) by PHP scripting and stored in a database. The design of the database allows the direct integration of metadata (Dublin Core Standard, LOM, etc.), multimedia objects like images and bibliographic data, etc. The whole set of interconnected XHTML documents can be automatically generated from the database to be then published on the Internet. This system of

learning material generation, which we call M²OST (Mindmap to Online Studies), is also able to integrate SCORM (Sharable Content Object Reference Model) content packages that could be imported into learning platforms/learning management systems (LMS) such as *WebCT Vista* (Budka et al. 2005). The main formatting of the web documents is accomplished through CSS (Cascading Style Sheets) in order to make the content fully accessible in accordance to the Web Content Accessibility Guidelines of the W3C (1999).

Besides a hierarchical sitemap, which includes the order number of the chapters, we are also creating "context sensitive imagemaps" by using the graphical map the *MindManager* is exporting. A combination of embedded Java Scripts and special CSS elements enables, by clicking on the imagemap icon, the visual orientation through a red arrow within the several branches of the imagemap.

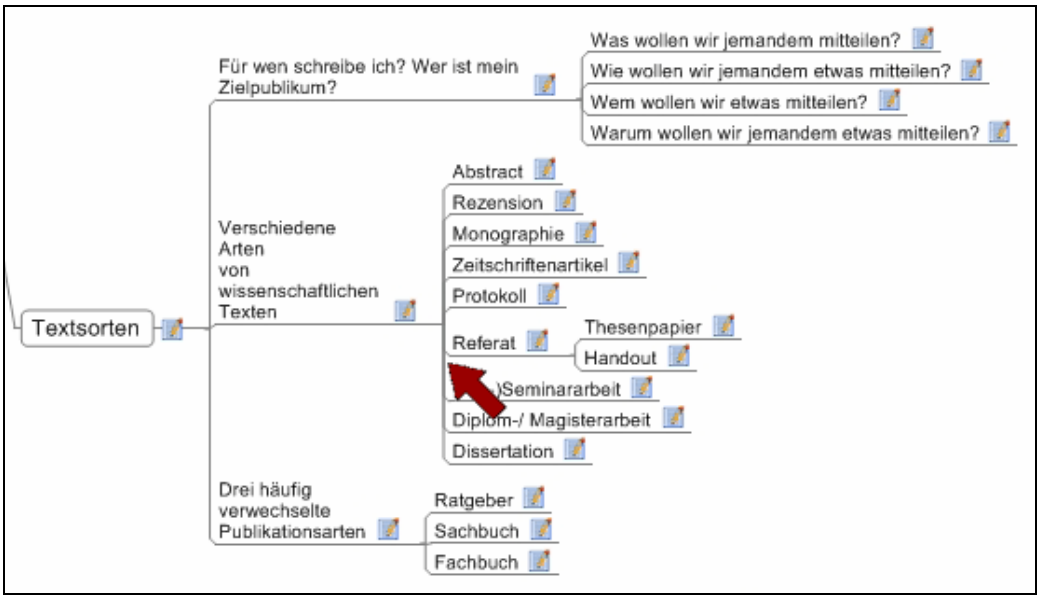

Figure 2: Section of the context sensitive imagemap

1.1.1 Wiki Linking – Making Documents and Knowledge Production Dynamic

A method which is tested within the e-learning project and which adds a dynamic feature to the collection of static XHTML pages is the automatic linking of these documents to a preinstalled wiki system (Budka et al. 2007). For this purpose a new PHP script, which automatically adds (hidden) links to each XHTML page of the learning unit, was written:

E.g. if the URL of a page has the following structure

http://[URL]/cp/qualitative/qualitative-1.html

the (hidden) link to the wiki would look like this

http://[URL]/wiki/Qualitative-1

Since this page doesn't yet exist in the wiki, it can be simply created by clicking on the link "create this page". This method is in particular suitable for seminars, workshops, and other "closed" courses. It could also be used by the author/teacher team to collaboratively annotate the hypermedia learning units.

2 A Case Study in Blended Learning

One of the first blended learning scenarios tested and evaluated for the e-learning project was conducted within the course "Anthropological Study of Myth" lectured by Elke Mader in the summer semester 2006 at the Department of Social and Cultural Anthropology. To collaboratively create analytical comments on selected mythological texts, students used a (1) hypermedia learning unit ("Ethnologische Mythenforschung – Anthropological Study of Myth"), the (2) learning platform *WebCT Vista*, and a specially constructed (3) wiki system (*WikkaWiki*). Each mythological text was analyzed by a group of students who also had to discuss and evaluate the contributions of their team mates to produce a coherent text till the end of the semester.

2.1 Modes of Interaction

These three e-learning elements of the blended learning model facilitate different "modes of interaction", discussed in detail by Anderson (2003a, 2003b) and Anderson and Garrison (1998) in the context of student-centred distance education: (1) student-content interaction, (2) student-student interaction, and (3) student-teacher interaction. In distance education these modes can be extended to further types of interaction that emphasis the content component.

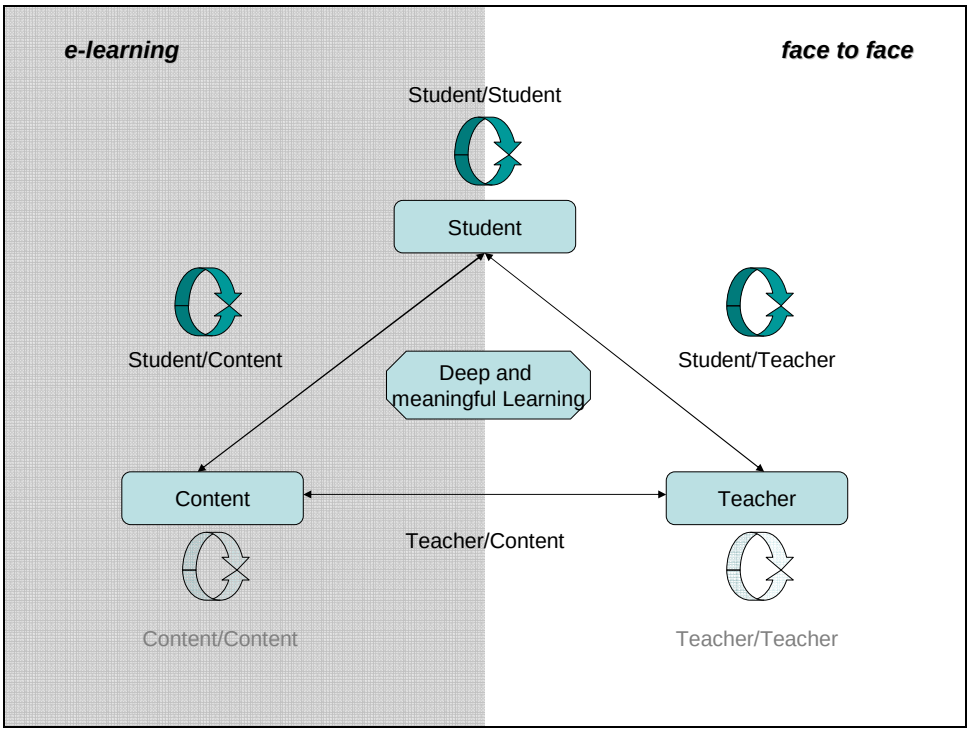

Figure 3: Modes of interaction in a blended learning scenario based on the modes of interaction in distance education from Anderson and Garrison (1998)

Blended learning scenarios as practised at the University of Vienna, on the other hand, use e-learning tools to enhance and strengthen different modes of interaction that are part of face-to-face meetings in the class room. In the context of our blended learning scenario the hypermedia learning unit allows for student-content interaction, which also can result in an increase of student-teacher interaction. By providing different communication tools, the e-learning platform contributes to teacher-student as well as student-student interaction. The wiki system is used as tool for creating knowledge within learning communities and teams by student-student as well as student-content interaction.

2.2 The Evaluation

The implementation process of the blended learning scenario was surveyed and evaluated by an expert in close cooperation with the project team and with the aim to systematically analyse students' changing attitudes and acceptance towards e-learning during the semester (Prilisauer 2007). Three different questionnaires were handed out to students at the beginning, in the middle and at the end of the lecture "Anthropological Study of Myth". To measure changes in attitude and correlations between preconditions, previous experiences as well as the general acceptance, usage and validation of e-learning, an anonymized numerical code was used to assign these questionnaires to students.

Fluctuating student numbers during the lecture resulted in different numbers of completed questionnaires at the three dates of data collection.[1] This fluctuation and change in participation caused a small sample that actually allows for a comparative analysis of the completed questionnaires. The comparative results of this survey are therefore not significant. Nevertheless we will briefly discuss some mayor findings of the survey, particularly in regard to e-learning experience, individual e-learning tool utilization, and the rating of these tools in the context of learning and knowledge acquisition.

90% of the 68 students who completed the first questionnaire are female. The average age was 25 years. 80% of the participants were studying Social and Cultural Anthropology in their 4th year.

Participants self-assess their computer competence on a fair level with 3,6 points on a 7-point Likert-Scale (ranging from 1 very low to 7 very high). 97% of the students own a computer or laptop and 84% have internet access at home. 52% of the students stated that they already had attended a course with e-learning elements in the past.

Within *WebCT Vista* most students had experience with the discussion forum tool (general discussion forum 50,7% and group discussion forums 41,7%). Nevertheless students communicated during the semester primarily via external e-mail clients (60%) and through the communication tools in the e-learning platform (55%). In addition face-to-face communication was of rather high importance to students (43%). The average student logged 2,4 times a week in *WebCT Vista* and used it for one hour per week. The majority of students (73%) had already experience with the usage of hypermedia learning units. 48% of the students printed the PDF version of the learning unit; 16% used the learning material online, and another 16% combined the online with the printed version. Only 12% of the students actively used the hyperlinks in the learning unit. On average the students logged 1,5 times a week in the Wiki system and used it for one hour per week.

The students rated the wiki system as rather not user-friendly and as not very helpful for conducting the learning process (assignments). 24% of the students actually had problems with the handling of the wiki. In comparison *WebCT Vista* was regarded as more user-friendly and helpful. Students' attitudes towards the hypermedia learning unit improved till the end of the semester. The learning unit was also rated best in all categories mentioned above.

24% of the students declared that their attitude towards e-learning in general got better during the lecture; whereas 20% stated that it got worse. 48% of the students would appreciate a

[1] At Austrian universities there is, in contrast to seminars, basically no mandatory attendance for lectures.

higher percentage of face-to-face sessions within this blended learning scenario. And only 16% would prefer a higher percentage of e-learning sessions.

3 Evaluating the bigger picture of interactive computer aided learning in social science education

Another evaluation within the e-learning project "Strategies of Networked Learning" takes a look at the bigger picture by surveying 333 students in 10 different courses in the winter semester 2006/2007 at the Department of Social and Cultural Anthropology of the University of Vienna. Two different types of courses were evaluated: (1) proseminars (PS) with mandatory attendance for students in their first two years of study and (2) lectures (LE) with non-compulsory attendance for students of all years.[2]

Proseminars (PS) are restricted to a maximum of 35 participants. Therefore, parallel courses are offered. Three courses of the PS "Quantitative Research" were evaluated, which aim at providing students with basic skills for a better understanding of the basic methods of quantitative research. Through presentations of theoretical issues, discussions, and the studying of relevant texts, students get prepared for creating, conducting and analyzing a survey. In addition, four courses of the PS "Scientific Writing" were evaluated, focusing on teaching the formal and stylistic skills of scientific writing within the field of social and cultural anthropology. Within the scope of these seminars, students practice to create comprehensive scientific and journalistic texts.

Lectures (LE) are basically open to an unlimited number of students and face due to non-compulsory attendance fluctuating student numbers. Within the frame of this evaluation three lecturers were analysed. The LE "Introduction to the Anthropology of Latin America" is targeted at undergraduate students and offers basic information about the regional research on Latin America. The LE "Economic Anthropology" focuses on the teaching of essential concepts and theoretical influences within this area. More advanced students learn within the LE "Culture–Space–Movement" about selected concepts and theories of the anthropology of migration, globalization, and representation.

According to our experiences in several e-learning projects (e.g. Mader et al. 2004, Budka et al. 2005) LE are most suitable for a service-orientated blended learning scenario because of the high number of students attending this type of course. Numbers are ranging from about 40 to 200 with a high level of fluctuation during the semester. Whereas the use of specific e-learning elements is necessary in order to achieve the overall objectives of the PS, the e-learning tools provided to LE students are considered as additional information service to the face-to-face classroom teaching.

For these courses described above, several blended learning scenarios were realized using (1) the e-learning platform *WebCT Vista* and (2) several hypermedia learning units. Both e-learning elements were used and integrated into educational practice by considering the specific structure of these courses.

[2] See Fillitz (2003) for a detailed discussion of the features of the *curriculum* at the Department of Social and Cultural Anthropology in Austria.

	PS Quantitative Research	PS Scientific Writing	LE Latin America	LE Economic Anthropology	LE Culture-Space-Movement
WebCT Vista	x	x	x	x	x
- Calendar	x	x	x	x	x
- E-Mail	x	x	x	x	x
- Announcements	x	x	x	x	x
- "Who is online"	x	x	x	x	x
- Exercises	x				
- "My Grades"	x				
Learning Units	x	x	x	x	
- Sitemap	x	x	x	x	
- Mind/Imagemap	x	x	x	x	
- Help	x	x	x	x	
- Search	x	x	x	x	

Table 1: The e-learning tools used within the different PS and LE

All evaluated courses except one, namely the LE "Culture-Space-Movement", utilized specific hypermedia learning units. The learning units for the PS "Scientific Writing" and "Quantitative Research" were produced within the project "Strategies for Networked Learning". The two other units "Social and Cultural Anthropology of Latin America" and "Economic Anthropology" were constructed in two previous e-learning projects: "Latin American Studies Online" (www.lateinamerika-studien.at) and "OEKU-Online" (www.oeku.net) respectively (cf. Budka et al. 2005).

3.1 The Evaluation

The implementation of the e-learning elements within the blended learning scenarios was evaluated by students in respect to the structure and functional use, the utility, and the comprehensibility as well as the personal usage of different tools.

The average age of the 333 students was 23 years, ranging from 18 to 72 years of age. 80% of the students were female. On average they were in their second year of studies.

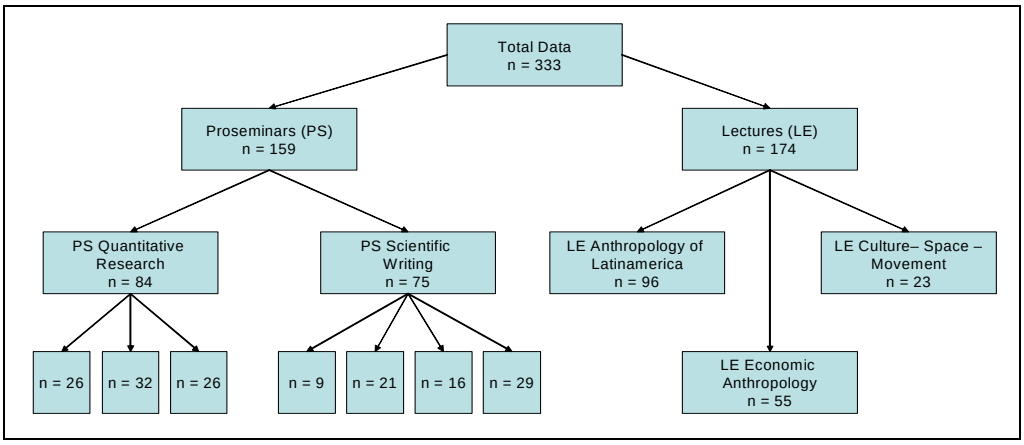

Figure 4: The allocation of the sample of students over different LE and PS

92% of the students used the internet at home; 50% at university and 11% at library and their work place respectively. 45 % of the students had earlier experiences with e-learning. Asked to self-assess their computer competence, students ranked themselves with 7,1 points on average on a 10-point Likert-Scale (ranging 1 very low to 10 very high).

As table 3 indicates, each evaluated course used *WebCT Vista* and within this platform different functions and features. 81% of the students evaluated the orientation within the e-learning platform as easy or very easy. Students were logging in the platform 2,7 times per week on average. Within *WebCT Vista* students communicated most frequently by using the integrated e-mail client (27%) and discussion forums, which were structured according to different thematic topics and purposes. 65% of the students had never or rarely technical problems in *WebCT Vista*. The more tools of the platform were used within the courses, the more problems students experienced.

The evaluation of the learning unit utilized in the PS "Scientific Writing" shows that the structure of the learning material was logical to the students, the subject matter was clearly formulated und understandable and the texts were comprehensible. Students experienced the navigation through the learning unit as user-friendly. The learning unit in the PS "Quantitative Research" was experienced in quite a different way than the unit in the PS "Scientific Writing". The subject matter and its explanation within the hypermedia learning unit were considered as rather complicated by 42% of the students (with only 3% found the unit "Scientific Writing" complicated). Another 24% rated the comprehensibility of the texts in this learning unit as rather complicated (compared to 8% in "Scientific Writing"). These diverting results in the evaluation of the explanation of the subject matter and the comprehensibility of the texts might be understood in the light of the different topics of the proseminars. To learn how to write scientifically seems easier for students than understanding quantitative methods and concepts, which are more closely related to mathematics. The structure of the learning unit "Social and Cultural Anthropology of Latin America" was considered logical by 74% of the students. The explanation of the subject matter was accurate for 73% of the participants. The last evaluated learning unit "Economic Anthropology" was considered logically structured by 83% of the participating students. 76% experienced the explanation of the subject matter as accurate. The results of all evaluated learning units indicate that quite a number of participants would appreciate more practical examples (between 29% and 41%), more graphics and pictures (between 14% and 40%), whereas the number of hyperlinks used in the different learning units was rated as "too many" or "too few" by approximately the same number of students.

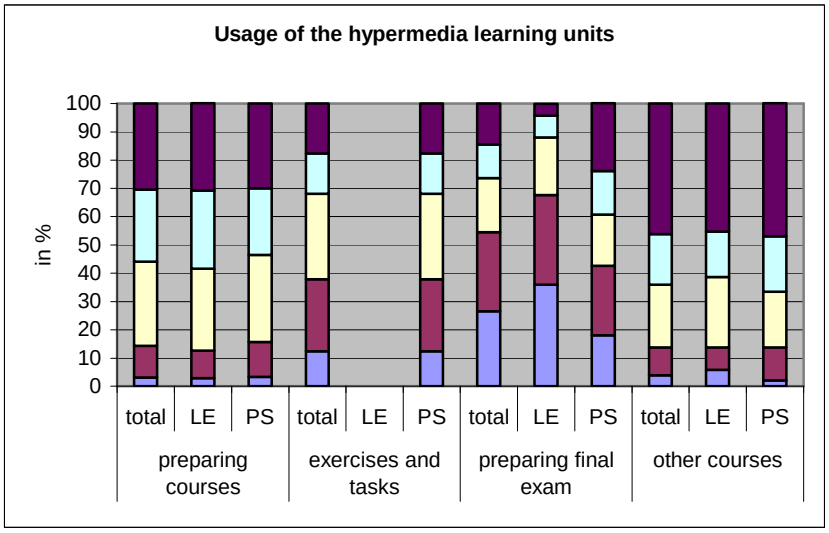

Figure 5: Usage of hypermedia learning units

Figure 5 indicates the usage of all evaluated hypermedia learning units within the respective courses. Students were asked how frequently they used the learning unit for the preparation of

the course, for exercises and assignments, for the preparation of the exam, or for other courses at the University of Vienna.

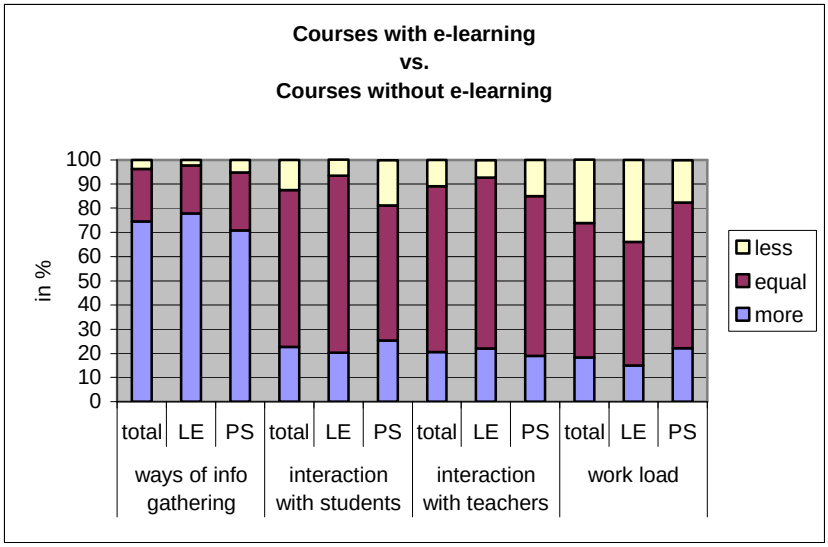

Figure 6: Courses with e-learning vs. courses without e-learning

Asked to compare the blended learning courses with courses without e-learning elements, 75% of the students considered e-learning supported lectures to provide better possibilities for information gathering. The majority of students experienced no difference in regard to interaction with other students (65%). Only 23% perceive more interaction in e-learning courses. Almost the same results were obtained in respect to student-teacher interaction: 68% see no difference between courses with e-learning and courses without e-learning; 21% experience more interaction and 11% less. Concerning the students' workload in e-learning and conventional courses, evaluation results show that within LE almost 51% of the students appraise the workload as constant, while 15% comment an increase and 34% a decline. In PS 60% of the participants remark a constant student workload, 22% an increase and 18% a decrease.

4 Conclusions

Results of the blended learning case study could indicate that communication tools in the e-learning platform *WebCT Vista* were in general more important to the students at the beginning of the semester. This could be explained by the important need to communicate, to get to know colleagues, and to form and organize working groups in the early phase of the lecture "Anthropological Study of Myth". At the end of the semester the basic networks between the students were established, and in the need of preparing for the final exam, other tools gained more importance.

The evaluation of the bigger picture demonstrates that e-learning experienced students considered the orientation in *WebCT Vista* easier and therefore used the e-learning platform more frequently than participants without such an experience (3,5 logins per week vs. 2,2 logins per week on average). Within the platform, inexperienced students made more use of the integrated communication tools.

In the context of the utilization of the hypermedia learning unit, we briefly discuss some highly significant results.[3] Experienced students preferred to use tools which give a complete picture and overview about the content, such as the sitemap and the mind/imagemap. Inexperienced students, on the other hand, rather used tools that are supporting the orientation and navigation within the learning unit, such as the “help” and the “search” function. Students with higher computer competence perceived the structure of the units as more logical than those students with less computer competence. More competent students also tend to use the learning unit more often for the preparation of courses and exams, and for completing exercises and assignments. Those students also use the learning unit not just for one purpose, but also in a variety of learning contexts.

The e-learning project “Strategies for Networked Learning” is one of the first major steps in the systematic integration of interactive computer aided learning in social anthropology education at the University of Vienna. Since the e-learning environment constructed within the project is open and free to use, it can be easily expanded and interconnected to similar e-learning systems at other universities, research facilities or educational institutions. Once comparable standards are implemented in the “European Higher Education Area”, evaluated and tested blended learning scenarios, such as those discussed within this paper, could be exported into similar settings at other social sciences departments.

These processes of identifying strategies, implementing tools and methods, and evaluating scenarios and models for e-learning in the social sciences need to be planned and conducted openly and holistic by integrating also the critical voices. Solely this way, e-learning will also find its place in technology critical environments such as social science education (cf. Budka 2006).

[3] In order to determine the relationship between computer competence and diverse forms of usage of the learning unit, a correlation analysis was conducted. A probability of $p <= 0,05$ was defined as significant, a probability of $p <= 0,01$ as highly significant.

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Authors:

Philipp Budka, Mag.
University of Vienna, Department of Social and Cultural Anthropology
Universitätsstrasse 7, A-1010 Vienna, Austria
philipp.budka@univie.ac.at

Elke Mader, Prof.
University of Vienna, Department of Social and Cultural Anthropology
Universitätsstrasse 7, A-1010 Vienna, Austria
elke.mader@univie.ac.at

Johann Stockinger, Dr.
University of Vienna, Department of Social and Cultural Anthropology
Universitätsstrasse 7, A-1010 Vienna, Austria
johann.stockinger@univie.ac.at

Katrin Prilisauer, Mag.
Vienna University of Technology, Continuing Education Center
Operngasse 11/017, A-1040 Vienna, Austria
prilisauer@cec.tuwien.ac.at

Elisabeth Anderl
University of Vienna, Department of Social and Cultural Anthropology
Universitätsstrasse 7, A-1010 Vienna, Austria
elisabeth.anderl@univie.ac.at