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Tertium comparationis 6 (2000) 1, S. 63-76



Quellenangabe/ Reference:

Paechter, Manuela: Learning and communicating in virtual seminars and lectures - In: *Tertium comparationis* 6 (2000) 1, S. 63-76 - URN: urn:nbn:de:0111-opus-28969 - DOI: 10.25656/01:2896

<https://nbn-resolving.org/urn:nbn:de:0111-opus-28969>

<https://doi.org/10.25656/01:2896>

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Learning and communicating in virtual seminars and lectures

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Abstract

The main concepts of instruction in the virtual university, virtual seminars and virtual lectures, are explained and illustrated by examples. Then, based on a model of instruction two important aspects and often obstacles to successful learning on the net are investigated more closely: communication and self-regulation of learning. The former aspect mainly refers to the concept of social presence, i.e. the extent to which a personal interaction with the communication partners is possible. Text-based communication which is predominant in internet instruction allows only a low degree of social presence, a rather anonymous interaction in which visual or auditory information as gesture or speech cannot be transmitted. Such a kind of communication poses severe obstacles to the learners' satisfaction with the whole learning setting as a survey in a virtual seminar could show. Another important aspect in virtual instruction are the high demands on learners' abilities to self-regulate their learning processes. They do not only have to determine when and where to learn but also how to process the learning material. Yet a survey in a virtual seminar showed that the possibility to decide on one's own learning processes is highly valued by students.

1 Organisation of learning and teaching on the internet

An overview of existing projects of learning and teaching (Below 1997) with the internet reveals mainly two forms: a) virtual seminars, the concept of "teletutoring" and b) virtual lectures, the concept of "teleteaching" (Ballin & Brater 1996; Euler 1998). Both forms of teaching are still closely related to the organisation of teaching in the on-campus university.

1.1 Virtual seminars – the concept of teletutoring

The concept of teletutoring was mainly derived from the concept of a seminar in the seminar room. In the following, it will be explained by the example of a virtual seminar developed and tested in our work group for a research project investigating the tutor's role for learning with the internet (Paechter, Schweizer & Weidenmann 1999; Weidenmann, Paechter & Schweizer 2000).

Of course, teletutoring shares common features with seminars held at a certain time and place. Both serve the purpose to impart knowledge or to support its acquisition.

Hence, instructional events – the external conditions to further knowledge acquisition – such as presenting learning material, stimulating recall of prerequisite learning, eliciting performance, feedback etc. (Aronson & Briggs 1983) are provided in both forms of teaching. Yet, the concept of a virtual seminar and its technical realisation differ in important aspects from seminars held at a certain place and time. In the seminar room, learning and teaching activities like the ones listed above may occur nearly simultaneously and spontaneously. In virtual seminars, however, these activities often occur separately from each other. On the one side, this is a result of different technical services that are used for the different activities of teaching and learning. World wide web pages are used to present learning material whereas other services such as e-mail or chats serve to make possible a communication between teachers and students or between students. Besides, the separation of different teaching and learning activities is a result of the spatial distance between learners and tutors.

In our research project we designed a central world wide web page which offered admittance to different communication and presentation services in which certain instructional events were provided. For the layout of this page we used the metaphor of rooms in a university (compare Figure 1).

Figure 1: Start page in the internet for a virtual seminar



(Translation: Hörsaal = seminar room; Bibliothek = library; Schwarzes Brett = notice board; Sprechstunde = consulting hours – tutor's office; Testraum = examination room; Studententreff = cafeteria)

The page offered admittance to the following facilities:

1. The *virtual seminar room* contains learning material in the form of computer-based training. The learning material was realised as a tutorial. Students could also obtain these tutorials offline on CD-ROM. Especially students with an external and hence costly internet termination may prefer offline learning material.
2. A *virtual library* offers additional learning material, e.g. texts, short computer-based training material, or software referring to the learning contents.

3. General issues about the course or new information can be found on the *notice board*.
4. In the *cafeteria* students may communicate simultaneously with each other. Technically, the *cafeteria* was realised as a chat.
5. If students want to communicate with the lecturer they have to visit the *tutor's office*. It offers the opportunity to send an e-mail to the tutor and to load down his or her messages.
6. The *examination room* was a special feature of our study. Students had to fill in tests on the learning material and questionnaires on the seminar.

The virtual seminar described here was carried out for one term (about 9 weeks) at the University of the Federal Armed Forces, Munich. The topic of the course was an introduction to Psychology with aspects such as “knowledge structures”, “learning with text” or “fundamentals of Cognitive Psychology”. At the University of the Armed Forces in Munich every student is obliged to attend an introductory course in Educational Sciences or Psychology. Therefore, students from all faculties (computer sciences, business administration, engineering etc.) attended the course. The course was organised so that every second week students received new learning material and had to fill in a test (in this case one speaks of a predetermined distribution of the learning material; Kerres 1997/1998). Within these two weeks they could decide when, where, and how to deal with the learning material.

The seminar described here shares common features with other approaches in and outside Germany (e.g. Open University Business School 1999; Heidbrink, Rogalla & Ströhlein 1998; Collis 1996): Learning material is distributed and presented, topics or exercises are given, learning contents are discussed between the tutor and the tutee or among groups of learners.

These features are certainly also found in the traditional classroom seminar. Yet the teletutoring example shows an important difference between the traditional classroom seminar and the virtual seminar, namely the demands on the learners' activities and abilities. In teletutoring learners gain a much higher responsibility for their learning processes and the organisation of these processes. The learners themselves have to organise when and where they work on the learning material, they have to decide how to process the learning material, when questions arise they have to seek contact with the tutor. The self-regulation of learning processes becomes an important issue.

In summary, on the one hand teletutoring shares common features namely certain instructional events with the traditional classroom seminar. On the other hand, teletutoring differs distinctively from traditional seminars, firstly, with respect to the demands on the learners' abilities of self regulation of the learning processes and, secondly, with respect to the technical and temporal separation of various instructional events.

1.2 Virtual lectures – the concept of teleteaching

The export of lectures via distribution media such as television, video cassettes, or CD-ROM is not a development brought along by the internet, but rather has been practised for more than one century (already in 1891 the University of Wisconsin offered a

distance learning course in which learning material in the form of print material was delivered by horse carriages; Below 1997).

For several decades distance education institutions such as the “Fernuniversität Hagen” (Germany’s largest Open University) or the Open University in Milton Keynes, UK have been using distribution media for the export of lectures (Fernuniversität Hagen 1996; Open University Milton Keynes 1999). Specially revised versions of lectures are broadcasted via satellite and TV. Each student may receive lectures with a TV set either simultaneously with or asynchronously after the recording of the lecture. Such an export of lectures, however, has distinctive disadvantages as students obtain no possibility to interact with the lecturer, to pose questions, or to determine the course or the speed of the lecture. Here, the internet offers completely new possibilities for the distribution of lectures. It enables not only an interaction between students and lecturers but also new possibilities to present learning material, e.g. in an animated form, as computer-based training material etc.

In the following, a teleteaching project is described which is not only typical for the existing concepts of teleteaching and its realisation but also gives useful insights into its advantages and disadvantages. Since 1995, the universities of Mannheim and Heidelberg have been co-operating by sending online-lectures simultaneously from one university to the other (Geyer 1999a, b). Students of the course “Technical Computer Sciences” in Mannheim may attend lectures which are held at the University of Heidelberg and are broadcast via an ATM high speed network to Mannheim to a specially equipped lecture room. In Heidelberg, together with electronic transparencies and other course material the teacher’s video and audio stream are captured by a local camera and microphone and broadcast to the remote lecture room in Mannheim (lectures are also transmitted in the opposite direction from Mannheim to Heidelberg; Eckert 1997; compare also other teleteaching approaches, e.g. the cooperation between the universities of Freiberg and Dresden, Neumann 1999). A multimedia conferencing system offers the possibility that participants in the remote lecture room may interact with the lecturer, e.g. by posing questions (Neumann 1999).

From an economical point of view this type of teaching certainly offers advantages: Temporal, personnel, and material resources for lectures held in a similar fashion at several universities may be combined. Other advantages of the internet, however, cannot be realised in teleteaching, e.g. learners cannot determine the place, pace, and time of learning.

This disadvantage stems from the requirement of synchronous communication and from the use of an expensive and complicated technique requiring technically specially equipped rooms for transmitting and receiving lectures. Synchronous communication offers the advantage of a coherent long term dialogue of questions and answers, though. Yet, it seems that in teleteaching situations such as the one described above technology imposes obstacles on communication. The participants in the online-lecture complained that the conferencing technique complicates the interaction with the lecturer as questions have to be announced to an operator beforehand (Eckert 1997).

In the concept of teleteaching, the lecturer guides and surveys the learning processes. She or he chooses the learning contents, decides on the structure and on the speed with which learning contents are presented. Besides, she or he controls the interaction with the

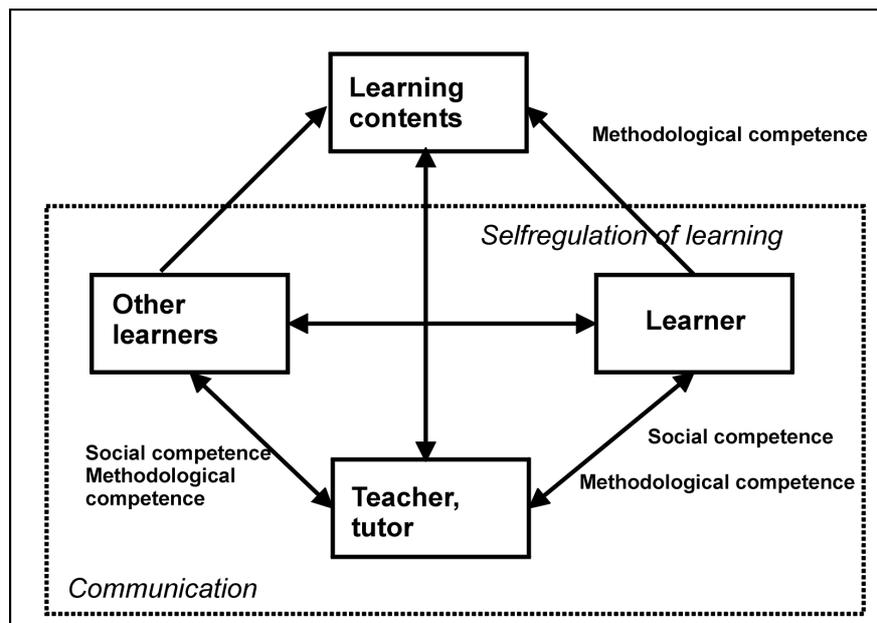
students. Learners cannot even influence the speed of learning as they have to follow the lecturer's speed of speech (studies on auditory information, however, have shown that reading is often more efficient than listening as learners can control the speed of reception, may easily repeat contents etc.; Paechter 1996).

2 Demands on learning, teaching, and communicating on the internet

2.1 A model of instruction

In the examples of teletutoring and teleteaching described above important elements of instruction were introduced: *Learning contents* are imparted to a *learner*. These learning contents may be conveyed by a *teacher or tutor*, or the learner her- or himself may acquire knowledge by learning with a computer-based training system. In the latter case, the tutor would rather have the role of an expert or coach who counsels the learner when questions arise. And usually, teaching and learning occurs in a social context with *other learners* working on the same topic.

Figure 2: Model of instruction



During the interaction with the teacher, with the learning contents, or with other learners students are to acquire “methodological competence”, i.e. the skills “to work on, to structure, and to solve learning tasks and problems, and to procure the necessary information in a process of self-regulated learning” (Euler 1998). Students, however, are not only to acquire methodological but also “social competence”. According to Euler (1998) this concept refers to skills such as readiness and competence to negotiate in a dialogue, to solve conflicts, to achieve a consensus, and to work as a team.

There are two central aspects in this model (see Figure 2): Firstly, communication as it serves to procure methodological as well as social competence and, secondly, the self-regulation of learning. Especially in teletutoring, the learner is to a high degree

responsible for ensuring the success of learning and for organising suitable conditions for learning.

2.2 Communication in virtual instruction

One of the most important problems of distance teaching (not only distance learning via the internet but also of traditional approaches in which learning material is sent as print material) is the students' communication about the learning material. In distance education students are usually cut off from any communication about the learning contents. Yet communication about the learning contents is crucial to the construction of knowledge (Gerstenmeier & Mandl 1995). In the process of explaining, reasoning, and of negotiating meaning learners have to monitor their thinking and learning processes and their path of learning (Wittenbaum & Stasser 1996). The exchange of information supports or even elicits metacognitive processes such as recognising and producing coherence or deducing rules (Noddings 1989).

The construction of knowledge occurs especially in horizontal interaction, i.e. the interaction of peers (e.g. students of a learning group). In horizontal interaction with group members of the same status members are often more highly motivated to express their expertise and to exchange ideas (Hatano & Inagaki 1991).

However, in traditional distance learning students' possibilities to communicate about the learning material are rather limited. This is different in the seminar room where a communication can be begun and maintained without greater effort. In comparison to traditional approaches of distance education internet-based courses gain most with respect to the aspect of communication (Lehmann 1998) even though it has to be admitted that compared to face-to-face communication internet-based communication still faces severe restraints. In this context it is noteworthy that the Open University in England provides tutor contact by phone and summer schools in addition to text (broadcast or written) material (Open University Milton Keynes 1999).

The problem of social presence in computer-based communication

Most teletutoring courses use communication services such as e-mail, newsgroups or chats (that are automatically provided by internet software or are easily obtainable and usable with nearly every technical equipment (compare seminars of Nistor & Mandl 1997; Heidbrink, Rogalla & Ströhlein 1998). Therefore, communication in teletutoring and teleteaching projects is mainly:

- *text-based* because internet services such as e-mail, chats, or newsgroups allow to transmit text-based information only. Of course, conferencing systems would allow to transmit not only text but also static pictures, film, or auditory information. Up to now, however, these systems are costly and their technical demands cannot be met by the standard technical equipment of most users. Besides, even video-conferencing systems cannot simulate the conditions of a face-to-face situation because important variables such as body space or eye contact are not properly transmitted. Therefore, such systems still do not create the same atmosphere of social intimacy as face-to-face interactions.
- *asynchronous* when internet services such as e-mail and newsgroups are employed. In this case information sent at a certain point in time is received only later. Chats,

however, allow for a *synchronous* communication. Sometimes, the receiver can even observe how the sender is typing her or his message.

The examples of e-mail, chats, newsgroups, or videoconferencing show that communication across media differs with respect to their bandwidth and the number of cue systems available within them (Walther 1992). Communication across various media can be ordered according to the “richness of communication” (Daft & Lengel 1984: 191). Face-to-face communication may be considered as richest as it allows verbal, paraverbal, and visual channelling and backchannelling cues, an immediate feedback, and a wide variety in expressing contents. Video-conferencing is still moderately rich compared to face-to-face communication and certainly richer than telephone interaction which restricts communication to auditory information. Communication based on written text and thus omitting visual and auditory information (e.g. chats, e-mail systems, or newsgroups) is regarded as rather lean with synchronous text-based communication still being richer than asynchronous text-based communication (McGrath & Hollingshead 1993).

Closely related with the richness of media is the concept of “social presence” (Short, Williams & Christie 1976: 65). A medium with a high degree of social presence allows a personal communication; one in which participants feel that they are jointly involved in the interaction and in which personal attitudes of the communication partners can be perceived. Such a communication usually is a “rich” one as visual (facial expression, gestures), verbal, and paraverbal (intonation of the voice etc.) information of the communication partners are conveyed. When cues about the interaction partner are filtered out social presence declines.

How may a low social presence influence communication (Short, Williams & Christie 1976; Kiesler, Siegel & McGuire 1984)?

- The fewer channels or codes available within a medium the less attention is paid to other participants in the communication. As social presence declines messages become more impersonal. The communication behaviour focuses much more on the task instead of on the co-participants.
- When social context cues are missing the social status of the participants is much less distinctly discernible and less likely to influence communication behaviour. Hence – as a rather positive result – participants who otherwise would not take part in a discussion also submit contributions. On the other hand, more extreme opinions are expressed and obtain more importance. Therefore, communication under conditions of low social presence, e.g. in text-based communication, may lead to more extreme decisions than face-to-face communication.
- Communication rules relying on facial expressions and gestures cannot be transmitted in text-based communication. Therefore, difficulties, e.g. in the coordination of contributions, may arise.
- Phenomena such as de-individuation in the sense of socially inadequate behaviour, excited and uninhibited communication such as flaming (insults, swearing, hostile, intense language), greater self-absorption versus other-orientation, and messages signalling status equalisation may occur.

A variation in the degree of social presence influences communication behaviour in a complex fashion. On the one hand, positive effects such as higher attention to the task

and a higher efficiency in decision making may be observed. Besides, due to less influence of status participants who otherwise would not have participated engage themselves in a discussion. On the other hand, a low degree of social presence may result in disturbing behaviour such as flaming (i.e. norm violating behaviour) and in a negative group atmosphere.

One, however, should take into consideration that research on the effects of varying degrees of social presence has been derived from very specific communication settings. The experimental research primarily emerged in the domain of synchronous group conferencing and organisational e-mail. Teleteaching and teletutoring situations differ from these communication situations in many aspects: They comprise a dialogue situation between an expert tutor and a novice learner as well as communication in a group of peer learners. Especially the interaction between a tutor and a tutee differs in many aspects from the settings in which social presence theory has been investigated: status can be distinctively perceived, the tutor has not only higher status but is an expert in the respective domain of knowledge, the communication between a tutor and tutees is often a dialogue between only two persons, not between a group of several persons etc. Moreover, social presence research focused primarily on dependent variables as decision making, group atmosphere, or choice of media and not on learning processes (compare investigations in Short, Williams & Christie 1976 and summary of social presence research in Walther 1992).

Impacts of the tutor's social presence: An empirical study

In the research project described earlier (compare teletutoring example) we investigated how differences in the social presence in which a tutor can be perceived influence students' assessment of a seminar (Weidenmann, Paechter & Schweizer 2000; Schweizer, Paechter & Weidenmann 2000). The tutor's social presence was varied in four levels:

1. The tutor communicated only by written text and asynchronously via e-mail with each tutee.
2. As in condition 1 the tutor communicated by written text via e-mail; however, the text was accompanied by a picture of the tutor corresponding to the respective communication content (the same e-mail system as in condition 1 was used but supplemented by the picture).
3. The tutor communicated auditorily and asynchronously (the same e-mail system as in condition 1 was used but instead of reading a text-based e-mail the tutee had to open an auditory file and listen to it).
4. The tutor communicated auditorily; besides, a picture of the tutor corresponding to the respective communication content was shown.

It was assumed that the tutor's social presence increases from condition 1 to condition 4 where students see the tutor's picture and obtain also paraverbal information by listening to her spoken statements (the tutor in the course was female). When students wished to communicate with the tutor they had to use the text-based e-mail system (in the virtual tutor's office). From the tutor's point of view students communicated only via text-based e-mail and hence with rather low social presence.

Students received messages from the tutor either in her “office” (e.g. when obtaining feedback on test results or answers to questions), on the notice board (e.g. the tutor’s introduction of herself), or on the learning material from the lecture hall. Not all instructional events were presented auditorily and eventually embellished by a personal view but rather those in which a high degree of social presence seems supportive to the learning processes. These instructional events had been derived from the instructional theory of Gagné and Briggs. They included learning situations such as “providing learning guidance”, “providing feedback”, “motivating” etc. (Aronson & Briggs 1983).

101 male students of the University of the Federal Armed Forces, Munich, studying different subjects (engineering, educational sciences, computing etc.) but all in the second term of their study participated in the experiment. Due to their different technical equipment the data of three students were not included into the study. Nearly all of the students were between 20 and 24 years old. 25 respectively 26 students were allocated to each of the four treatments. It was recorded how often every student used the services of the internet environment.

In summary, students accessed the internet environment 3452 times. 756 times they filled in tests in the examination room, 414 times they visited the virtual library, 913 times the notice board, 1208 times they read the tutor’s messages and 161 times they sent messages to the tutor. The tutor wrote 570 messages (many of these were sent to more than one participant). These numbers prove quite impressively how much work has to be invested for the implementation and carrying out of a virtual seminar.

At the end of the study after nine weeks of teletutoring students were asked to assess statements such as

- “I would have learned better in a seminar held in the seminar room at a certain point in time.”
- “I would have needed less time in a seminar held in the seminar room at a certain point in time.”

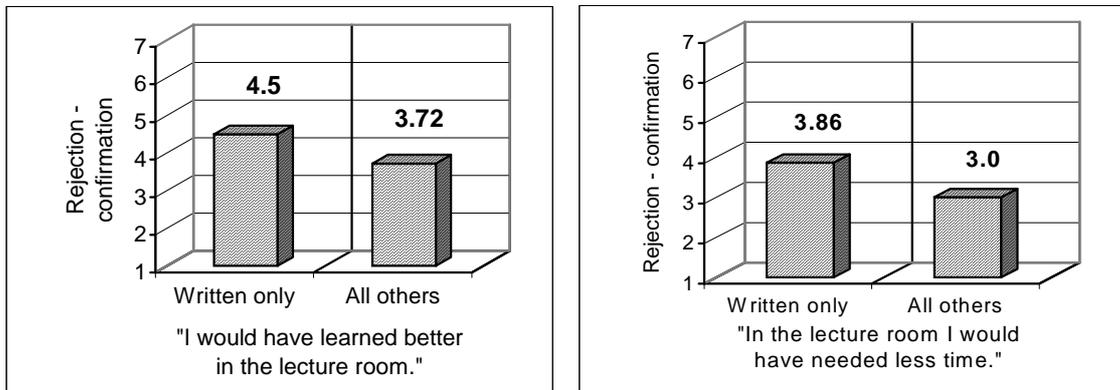
Besides, students were asked to assess learning with the computer and internet by the following statements:

- “I like learning with the computer because it allows to learn on my own.”
- “I prefer learning with the computer to learning in a traditional seminar.”
- “I prefer learning in a traditional seminar.”
- “I prefer learning with the computer as I can plan my own time schedule.”

Students were to assess all statements on a scale ranging from 1 (completely wrong) to 7 (definitely true). For each participant a mean of the assessments of computer- and internet-based learning was computed expressing an overall assessment. For the statistical analyses assessments partly had to be re-coded so that high values indicate a positive evaluation. 91 participants filled in the final questionnaire.

The evaluations of participants in the treatment with rather lean communication (only written text) were compared to those of all other treatments. The participants’ judgements in the experimental treatment of low social presence (tutor’s messages only transmitted as text) differed significantly from all other judgements.

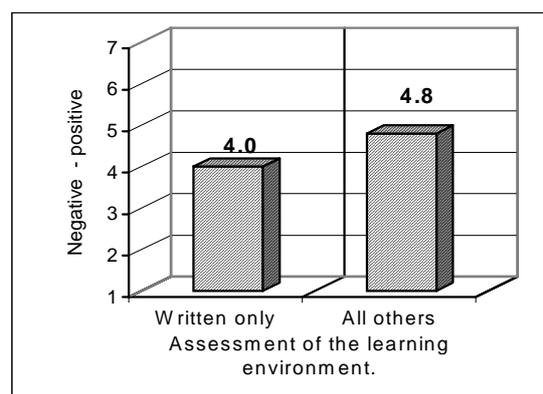
Figure 3 and 4: Assessment of the teletutoring setting under different degrees of social presence (n=91)



Participants in the experimental treatment of low social presence of the tutor (written communication only) believe that they would have learned better in a traditional lecture room setting (mean of 4.5 in the group with written text only versus a mean of 3.72 in all other groups; differences were tested with a t-test which yielded a significant result with $p=0.049$, $t=1.673$, $df=91$). Besides, this group rejected the assumption that they would have learned faster in a traditional seminar less distinctively (mean of 3.86 versus a mean of 3.10; differences were tested with a t-test which yielded a significant result with $p=0.04$, $t=1.772$, $df=91$) (see Figure 3 and 4).

Besides, the participants in the condition of low social presence assessed learning with the computer and internet significantly more negatively than all other participants (mean of 4.00 versus a mean of 4.8; differences were tested with a t-test which yielded a significant result with $p=0.016$, $t=-2.183$, $df=91$) (see Figure 5).

Figure 5: Assessment of learning with computer and internet under different degrees of social presence (n=91)



The statistical results show that a variation of the tutor's social presence influenced the assessment of learning with computer and internet. Under conditions of low social presence students were generally less satisfied with the teletutoring setting and believed they would have learned better in the seminar room. One may conclude that the

conditions of communication in a virtual seminar are crucial to the students' satisfaction as they influence the overall assessment of the seminar.

2.3 Learners' self-regulation of learning processes in virtual instruction

Virtual instruction poses great demands on students with respect to the organisation of the conditions of learning. Instead of getting certain knowledge presented in a certain structure, at a certain time, and at a certain place students themselves have to organise how, when, and where (and partly even what) to learn – here one speaks of self-regulation of learning (Friedrich & Mandl 1997). The self-regulation of learning in the virtual seminar concerns the regulation of the outer conditions of learning as well as strategic and cognitive processes such as how to work through a certain text.

In comparison, seminars and lectures on-campus structure the student's daily learning schedule in a strong fashion and include many social obligations. If e.g. one misses a class one also misses fellow students and possibly one's missing might be noted by the lecturer and future examiner. If one has promised to present a seminar paper one is under an obligation to the lecturer and fellow students and, besides, one gets valuable feedback and maybe even new thoughts on the topic when presenting the paper. The social sanctions and commitments described here are much less distinctively perceptible in the teletutoring situation with a virtual learning group. Hence, students need a large amount of self-discipline when learning in the virtual seminar – which mostly means learning at home, providing for one's own time schedule and for opportunities to learn without any interference from outside.

These high demands on the learners' self-discipline and self-regulation abilities are certainly one important reason for the high dropout in distance education courses. In the teleteaching project between the universities of Heidelberg and Mannheim a dropout of 30 % was observed (Geyer 1999a); generally, the dropout in distance education courses lies between 30 % and 90 % (Kerres 1997/1998).

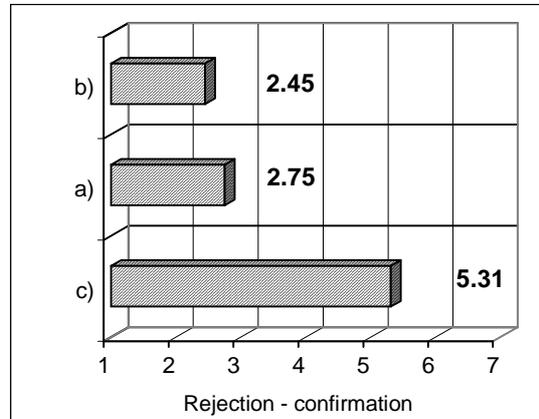
Virtual seminars not only pose high demands on learners to organise when and where but also how to learn. In teletutoring, learning material is mainly presented in form of computer-based training (examples from Below 1997; project of Weidenmann, Paechter & Schweizer 2000). Students have to decide how to structure the learning material and when to seek help from an expert tutor. The latter is not per se available but only when the learner actively seeks contact. Often the dialogue with the tutor is an asynchronous one preventing a simultaneous exchange of question, answers etc. Hence, students have to plan carefully what questions to ask the tutor at what time.

Do learners regard the high demands on self-regulation as positive aspects of the virtual seminar or do they find it rather a burden? At the end of our project, students were asked to assess the self-regulation of learning in their virtual seminar. Therefore, they had to assess statements such as the following ones on a seven-point scale (ranging from 1, completely wrong, to 7, definitely true):

- a) "I would have preferred a seminar held in the seminar room at a certain point in time because I would not have needed to organise learning on my own."
- b) "I would have preferred a seminar held in the seminar room at a certain point in time because of the predetermined time schedule."

c) “I would have preferred a seminar held in the seminar room at a certain point in time because of the possibility to communicate directly with the tutor.”

Figure 6: Assessment of self-regulation in teletutoring (n=91)

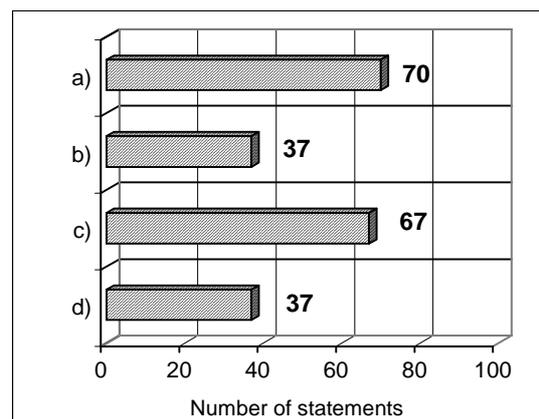


The results (see Figure 6) prove that participants rather appreciate the necessity to learn on their own and to plan their time schedule on their own.

Both assessments in favour of a seminar in the seminar room, (a) not having to organise learning and (b) a fixed time schedule, were rejected (mean of 2.75 for (a) and of 2.45 for (b); n=91). Students, however, regretted the missing opportunity to talk directly to the tutor (c) (mean of 5.31, n=91).

Besides, students were asked to give answers to the open questions “I think an advantage of learning on the internet is ...” and “I think a disadvantage of learning on the internet is ...”

Figure 7: Advantages and disadvantages of teletutoring



70 of 91 students mentioned the organisation of one’s own time schedule (a) (in Figure 7) and 37 the possibility to determine one’s speed of learning (b) as an advantage (students were allowed to give more than one answer). The limitations in the communication with the tutor (c) were mentioned as a disadvantage by 67 students and the high demands on resources with regard to technique, time etc. (d) were stated by 37 students.

These results show that students regard the high demands on their self-regulation as a positive aspect of the virtual seminar.

3 Conclusions

The present paper gave an insight into the most widely used types of instruction on the internet: Teletutoring, the virtual seminar, and teleteaching, the export of lectures via distribution media. Certainly, one of the main advantages of teletutoring is the learner's independence of time and place and – closely related to this aspect – the possibility to self-regulate one's learning processes. In comparison with seminars in traditional distance education teletutoring gains most with respect to the communication between students or between the tutor and students. The concept of teleteaching, however, offers mainly economical advantages as universities or educational institutions may combine material and personal resources. Mostly, students have to visit teleteaching lectures in a certain especially equipped room at a certain point in time.

The survey in the virtual seminar presented beforehand indicates the importance of the tutor's social presence. If students obtain a personal view of their tutor – even if only a static picture and recorded speech – they are more satisfied with the seminar as a whole. The survey also shows how time-consuming and demanding a virtual seminar can be for a tutor. The data support the notion that virtual instruction needs time and a well-defined concept to support learning processes and to keep students satisfied with the conditions of learning.

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