Student-centred Learning in a Telematic Learning Environment

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Abstract: Due to an increasing number of part-time and adult students and new visions of the learning process, a need has arisen for a more flexible and student-centred form of education. The Internet offers a useful setting. The Institute of Education, Utrecht University, transformed an existing teacher-oriented course on 'designing a research problem' into a student-centred telematic learning environment, called PreScriptum. In this environment students can arrange their own learning process. They can choose their own path between and within the different modules. The teacher provides the students with individual written feedback on their assignments. Research shows that students do in fact follow different educational routes through PreScriptum. We conclude that this is possible through an effective use of hypertext, different functionalities and a non-linear design (content) in the learning environment.

1. INTRODUCTION

For over 15 years, the Institute of Education (IVLOS) a department of Utrecht University has given numerous successful courses geared to the acquisition of academic skills, such as writing and defining a research problem. University students from all grades and disciplines can follow these courses on a voluntary basis. Until recently, these courses were teacher-oriented with students attending classes located at the university.

Due to societal changes such as the shift to an information society, an increasing number of part-time and adult students, and new visions on the learning process, a need arose for alternative forms of education (Plomp et al. 2000). Learners have to become more active and more responsible for arranging their own learning process. Thus, education needs to be more flexible and learner-centred. Modern technological opportunities, like the Internet, make it possible to meet these needs.

However, most of the current ICT-applications are used to facilitate teacher-oriented arrangements of the learning process (Veen et al. 1999). IVLOS took up the challenge to develop a student-centred telematic learning environment (TLE) on 'defining a research problem' as the basis for a research plan (outline). The starting point was an existing course which was already running quite successfully. In our TLE, we wanted to keep the successful parts of this course and expand it with the new possibilities which the Internet offers.

In this paper, we focus on the following question: which characteristics of a TLE transform an existing, teacher-oriented course into a student-centred learning environment? We will start with a description of the existing course. Afterwards, we will describe the design and evaluation of the TLE, called 'PreScriptum'. We will end the paper with conclusions and a discussion.

2. EXISTING COURSE ON DESIGNING A RESEARCH PROBLEM

In this paragraph, we will describe the educational format of the existing course. Students, PhD or other, can sign up for this course if they have an approved research topic and a subject matter coach at their faculty. The essence of the course is that it deals with the formal aspects of a research problem and not the content. More specifically, students learn an approach. They learn how to define their research problem and draw an outline of their research paper or thesis, before they actually start to collect the data and to write eventually.

This course has been successful for 15 years. It is given several times a year and approximately 10 to 15 students participate each time. In sum, approximately 250 students attend the course each year and by now, IVLOS has given this course to over 3,000 students.

2.1 Educational design

The organisation of the learning process can be characterised as ‘teacher-oriented’, despite the use of various instructional formats, such as individual assignments and exchange between students. The sequence of the subjects to discuss is preformatted and the teacher determines the agenda for the meetings.

Before going into more detail on the course, we will first describe a few basic principles (Oost and De Jong 1996).

1. Students work with their own material during the course. Thus, in this course on designing a research problem, students work on their own research project.
2. The course is very structured. It consists of six sessions which take place in a class setting at the university. Each session has the same structure.
3. A third principle is the exchange between students. Students discuss each others assignments and provide each other with oral feedback.
4. Finally, the course can be followed by students from different disciplines. The course is about generic skills and not subject matter knowledge.

The first session is an introductory one in which the purpose and method of the course are described. In the remaining five sessions, the five key components of the course are discussed in a fixed order; that is: (1) disciplinary embedding, (2) research question, method and answer, (3) research sub-questions, (4) objective, and (5) chapter order and work plan.

In the first hour and a half of each session, the teacher describes, explains and discusses the theory and students work on general assignments. During the remaining hour, students work on a specific assignment involving their own research. Thus, students apply the things they have learned to their own material. At the end of each session, the students hand in their assignment. The following week, the teacher returns the individual assignments with written feedback.

Students work with a syllabus, in which the theory is described and with a preformatted workbook, in which they work out their assignments.

The existing course on defining a research problem has mainly been teacher-oriented. Students can take an active role to a certain extent and they work with their own material, but they do not have the freedom to follow the course at their own time and pace. Furthermore, all students have to follow the same preformatted programme in which individual wishes and differences between students are not taken into account.

3. STUDENT-CENTRED EDUCATION AND THE INTERNET

Nowadays, a need exists for more flexible and learner-centred education. For instance, with the need for 'life-long learning', education has to deal with different types of learners with different educational backgrounds and baggage. Learner-centred education offers an optimal educational setting for these different types of learners, where traditional teacher-oriented education fails to do so.

What is learner-centred education? In learner- or student-centred education the learner or student not only takes an active role, but they are also responsible for the arrangement of the majority of activities belonging to the learning process. In a 'traditional' arrangement of the learning process, the teachers control these activities (Plomp et al. 2000). It is assumed that ICT can facilitate the shift from a more teacher-oriented towards a more learner or student-centred education (Montgomery 1995, Plomp et al. 2000).

At IVLOS, we experienced an increasing demand for a more student-centred education (we prefer to use the term student-centred instead of learner-centred because IVLOS mainly deals with students in higher education). Furthermore, we already had experience with ICT in education. Thus, it seemed logical to integrate the two. We decided to take up the challenge to rebuild the existing course on designing a research problem into an on-line learning environment.

The fact that a PhD-thesis on this subject appeared at the end of 1999, was an extra impulse to develop the TLE. In his thesis about the quality of research problems in dissertations, Oost (1999) introduces a model of the structure of a research question, i.e. a standard defining and clarifying the criteria a research problem should meet. The structure model consists of five elements: question, discipline, reason, strategy, and answer. The model in itself is non-linear, which means that there is no sequential order in handling the elements. After all, all elements should fit together logically.

The Internet, with its hypertext structure fits perfectly with the non-linear structure model. Hypertext is the organisation of information units into connected associations that a user can choose to make. An instance of such an association is called a link or hypertext link (<http://whatis.com>). "These links may be represented textually or graphically and provide information users with an ability to control the sequence of information as well as to 'navigate' within a rich information environment" (Jaffe 1995). In other words, users are able to construct their own way by chunking and linking from topic to topic rapidly and non-sequentially through the material presented on the Internet.

4. DESIGNING A RESEARCH PROBLEM

The TLE on designing a research problem was developed in WebCT (<http://www.webct.com>) and received the name PreScriptum. We chose WebCT because this software contains the three main categories of functionalities of a TLE which we wanted to integrate into the course, that is: information, communication and interactivity.

4.1 Something old, something new

With PreScriptum, we wanted to rebuild the existing course into a student-centred TLE. In order to do so, we had to evaluate the basic principles of the course. Three of the four basic principles of the existing course (see paragraph 2.1) remained starting points of PreScriptum as well. (1) Students work with their own material, they complete an assignment and they receive written feedback individually from the teacher. (2) PreScriptum is about generic skills instead of subject matter knowledge. (3) The nature of PreScriptum is still very structured. These principles made the existing course a success and, as such, we wanted to keep them in the new set-up. In contrast with the existing course, exchanges between students are optional in PreScriptum.

To develop a more student-centred TLE, we had to rewrite the existing course for two reasons. In the first place, the new theoretical insights of the non-linear structure model lead to new content. A second reason was the nature of this new medium. Writing for the Web is completely different than writing for a printed publication due to the hypertext structure: "...proper hypertext structure is not a single flow 'continued on page 2'; instead, split the information into coherent chunks that each focus on a certain topic. The guiding principle should be to allow readers to select those topics they care about and only download those pages" (Nielsen 2000, p.112). One also has to take into account how people read web pages. Reading from a computer screen is about 25% slower than reading from paper. Thus, the text we wrote for the TLE had to be succinct. Furthermore, we wrote for scannability. Users do not want to read long continuous blocks of texts; therefore, one needs to write short paragraphs and make use of subheadings and bulleted lists (Nielsen 2000, p. 101).

4.2 The new educational design

Because PreScriptum is based on a non-linear model and because hypertext provides for non-linear learning and thinking (Jonassen et al.

1999), we wanted to deliberately develop PreScriptum in a non-linear way, not only at the level of the modules, but also within each single module.

PreScriptum consists of five modules: disciplinary embedding, relevancy, precision, methodical functionality and consistency. These modules can be found as buttons on the Homepage of PreScriptum, along with the calendar, bulletin board and e-mail.

The non-linear nature of PreScriptum makes it possible for each individual student to decide where to start in the programme. We developed it in such a way that each single module can function as a starting module. All modules have the same set-up (see Figure 1) but a different colour, which facilitates navigation through the site.

Figure 1. Example – in Dutch – of the set-up of a module (i.c. 'Relevancy')

PreScriptum is also non-linear within each individual module. We made use of hypertext in such a way that students can also decide what to start with in each module; that is, students can start with an exercise (interactivity), first study the theory (information) or do a self-test (interactivity). Depending on the concern of the individual student, he or she can choose the appropriate starting point. In the end, all the students have to complete an assignment and place this on the bulletin board on time. Thus, in fact "multiple versions of the materials can be developed by (.....) the learners themselves, while the instructional product can be maintained in its original version" (Bevilacqua referred to in Ambrose 1991).

PreScriptum is a complete on-line learning environment except for the plenary starting and closing sessions which take place at the university. From former experiences (Veen et al. 1998), we learned to integrate an on-line experience with at least one plenary face-to-face starting meeting. We integrated the plenary face-to-face closing session in the design to really mark the end of the course. During the starting session, the method of work is explained and students practice with submitting a message to the bulletin board in PreScriptum. At the closing session, students reflect on their experiences and they fill in an evaluation questionnaire. During the five weeks between those sessions, students complete an assignment each week, which they place on the bulletin board before the stipulated time and date. There is no syllabus or workbook, the whole learning takes place within the TLE.

Thus, in contrast with the existing course, the organisation of the learning process in PreScriptum is meant to be student-centred. The teacher creates the structure and limits the learning environment, but the student is in control of their own learning within this environment. Students can follow PreScriptum at their own chosen time, pace and place. They can also determine for themselves which route they want to follow in the course, not only with regards to the whole module, but within each module as well. In other words, students can follow their own learning styles, something that can hardly be achieved in large classes. The teacher's role is to provide the students with individual written feedback on their five assignments and to be available for (e-mail) questions.

To conclude, from the instructional designers point of view, PreScriptum is created in such a way that students can use it in a non-linear manner. Do students actually choose a non-linear educational route through the course? In the next paragraph we will go into some more detail on this aspect.

5. DO STUDENTS USE A NON-LINEAR ROUTE?

Three pilots took place during Spring 2000. In total, 15 regular students and 10 PhD students worked in PreScriptum. Every pilot was evaluated through a questionnaire. Overall, PreScriptum received a positive evaluation. In the context of this paper, we particularly want to know whether the students did indeed choose a non-linear route throughout PreScriptum, both between the modules as well as within the modules. We make a distinction between regular students and PhD-students because the latter group had a slightly different instruction: they were not supposed to work on the Consistency module during the pilot.

Table 1. Students (N=15) and PhD-students educational route (N=10)

<i>Regular students educational route through the modules of PreScriptum</i>				
➔				
Discip.	Relevancy	Precision	Meth.funct.	Consistency
Discip.	Precision	Relevancy	Meth.funct.	Consistency
Discip.	Precision	Consistency		
Discip.	Relevancy			
Relevancy	Discip.	Meth.funct.		
Relevancy	Discip.	Precision	Meth.funct.	Consistency
Relevancy	Precision	Meth.funct.	Discip.	Consistency
Relevancy	Precision	Discip.	Meth.funct.	Consistency
Relevancy	Precision	Discip.		
Relevancy	Meth.funct.	Precision	Discip.	Consistency
Relevancy	Meth.funct.	Precision	Discip.	
Meth.funct.	Discip.	Precision	Relevancy	
Meth.funct.	Relevancy	Precision	Discip.	Consistency
Meth.funct.	Relevancy	Discip.	Precision	
Meth.funct.	Relevancy	Discip.	Precision	
<i>PhD-students educational route through the modules of PreScriptum</i>				
➔				
Discip.	Relevancy	Precision	Meth.funct. (3x)
Discip.	Precision	Relevancy	Meth.funct.	
Discip.	Precision	Meth.funct.	Relevancy	
Relevancy	Discip.	Precision	Meth.funct. (3x)	
Relevancy	Precision	Discip.	Meth.funct.	
Meth.funct.	Discip.	Precision	Relevancy	

Table 1 indicates that with respect to the module level, both regular students and PhD students did, in fact, start with different modules in PreScriptum. Half of the group of regular students started with the ‘Relevancy’, while half of the group of PhD students started with the ‘Disciplinary’ embedding. As these were the modules we demonstrated during the two starting sessions, there might be a relationship between those two aspects. Interestingly enough, no one started with the ‘Precision’ module.

Furthermore, it is remarkable that both groups of students do not continue their educational route in a similar way, even when they share the same starting module. For instance, Table 1 indicates that the seven regular students who started with the module Relevancy, all – except for two – continued in a different way through PreScriptum. The 10 PhD students

chose six different routes, two of which proved to be quite popular. Three PhD students followed the route starting with the module Disciplinary embedding. The route starting with the module Relevancy was chosen by three other PhD-students, two of whom collaborated throughout the course.

With respect to the students' route within the modules, we do not have detailed information. What we do know is that the majority of both regular and PhD students start each module by studying the theory. Afterwards, they generally do the exercises and self-tests, that is, the interactive functionalities. The least used functionalities are the frequently asked questions (faq's), references and notes.

6. CONCLUSION AND DISCUSSION

We have focused on the question: which characteristics of a TLE transform an existing, teacher-oriented course into a student-centred learning environment? To answer this we described the design and development of PreScriptum, a TLE on designing a research problem. New to PreScriptum, compared to the existing course, was the introduction of non-linearity at the level of the module as a whole as well as within each module.

PreScriptum turned out to be at least as successful as the existing course. Both, regular students and PhD students gave the on-line learning environment a positive evaluation on various aspects, such as the content, pedagogy and techniques. At the module level we noticed that most students follow different educational routes through PreScriptum. Furthermore, within each module, the results showed that most students prefer to begin by studying the theory. They differed in the functionalities they subsequently prefer, although the exercises and self-tests are most frequently used.

Considering the variety of educational routes, we can conclude that students took advantage of the opportunity to arrange their own learning process. As such, PreScriptum can be considered an example of a student-centred TLE. The effective use of hypertext, different functionalities and a non-linear design (content) are the main characteristics which make the development of such a student-centred TLE possible.

In this paper, we have shown that students follow their own chosen route through PreScriptum. However, we have not, investigated if each student chose the most optimal route for his or her learning process. Therefore, our next step will be to experiment with a so-called diagnostic module. With the integration of such a module in PreScriptum we want to find out if it is possible to give individual students a personal advice on the 'optimal route to follow through PreScriptum'.

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BIOGRAPHY

Ineke Lam, a qualified consultant and researcher, has worked since 1994 at IVLOS, Utrecht University. She works with ICT-projects such as T3-project (Telematics for Teacher Training), ICT in Higher Education, and PreScriptum: a WebCT telematic learning environment. She is especially interested in telematic learning environments, didactics and fascinated by non-linear learning

Angela Markenhof, also at IVLOS, Utrecht University specialises in research planning and the pedagogy of academic skills. She has lectured extensively in these fields. She teaches degree and postdegree students how to construct and formulate a well-defined, relevant research problem. In conjunction with Ineke Lam she designed PreScriptum.