Blended Learning Design in Vocational Teacher Education

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The School of Vocational Teacher Education in Oulu, Finland has offered an alternative way of compulsory studies in vocational pedagogy (15 ects) as a blended learning course. In addition to on-campus learning, the course includes distance learning and working in different e-learning environments. When planning a long-term blended learning course the significance of planning the whole entity is emphasised. The aim of planning the course which is reported in the present study was to make various content-specific, methodological and technical solutions visible, and highlight their importance in the educational whole by making their modelling observable.

In this article the design and entity of a blended learning course is evaluated from the viewpoint of Badrul Khan´s octagonal framework of e-learning**.** The framework has eight dimensions: pedagogical, technological, interface design, evaluation, management, resource support, ethical and institutional dimensions from which points of view the processes and outcomes of the course are examined. Thus the presentation will describe the pedagogical and technological solutions of the course, as well as evaluate and reflect on the significance of pedagogical modelling in planning a blended learning course.

Background

Oulu's School of Vocational Teacher Education, is one of the five vocational teacher education units in Finland situated in the universities of applied sciences. It primarily educates teachers for vocational secondary and tertiary levels, as well as, vocational adult education, but is also designed to give general qualifications for teaching the subjects included in the basic examination. After passing the studies of 60 ECTS credits the students are typically employed by Finnish universities of applied sciences, vocational institutes or adult education centres.

Oulu's school of vocational teacher education enrols students from the area of northern Finland. To become accepted, students must have the highest vocational degree in the subject and at least three years work experience. Consequently, the average age of the students is 40. They are adults, who in addition to their teacher studies, work either as teachers or are employed by enterprises.

Considering the backgrounds of the students, it is understandable that they must be offered methods of study that are suitable for adults and make distance learning and flexible studying possible at the same time as going to work. The purpose of this article is to explain the blended learning alternative for studying the most central contents of the program.

The aim of the 15 ECTS credit course, named Vocational Pedagogy is to acquaint the student teachers with the basics of a teacher´s work in the vocational field. The course consists of issues concerning the field of action and the duties of a vocational teacher, learning conceptions and theories, interaction and supervision skills, familiarization with learning and teaching methods, information and communication technology in teaching, as well as, educational and pedagogical planning and evaluation.

A conventional way of arranging the course in Oulu is through 10 contact days on campus, several assignments connected to the contact days as well as a comprehensive written learning portfolio. The majority of the student teachers will choose this alternative. In 2006 the school started planning an alternative way of organizing the course according to the blended learning model. The central idea was to offer the core contents of the course via online and distance learning methods and to combine on-campus and online learning.

What does blended learning then mean? Most commonly it is understood as a teaching method benefiting both conventional face-to-face teaching methods and e-learning activities. From this viewpoint the question is of a hybrid of classroom and online learning. (Oliver & Trigwell 2005; Littlejohn & Pegler 2007, 26.) On the other hand, the concept of blended learning also includes many other meanings.

Suggestions of the meanings of blended learning range from blending informal and formal learning, blending work-based practice and on-campus learning, blending self-paced and collaborative learning, blending various media and tools employed in an e-learning environment and blending various pedagogical approaches etc. (Singh 2003; Oliver & Trigwell 2005; Littlejohn ja Pegler 2007, 47.)

As the concept of blended learning has been considered unclear (Oliver & Trigwell 2005), it is justified, in order to avoid confusion, to define it as ´the blending of face–to-face-learning and online learning´. It may be admitted, though, that the course of Vocational Pedagogy described in this article also includes several other meanings of blended learning. The course benefits from both on-campus and online learning, asynchronous and synchronous online learning, and various software applications. In addition, the planning of the course has been influenced by several methodological bases and the learning situations have been organized to consist of both individual and group studies.

Khan's framework of e-learning design as the organizer of research

In this article the blended learning design principles of the course called Vocational Pedagogy are examined and evaluated within the framework organized by Badrul Khan (2003; 2005b; 2005b). Khan´s aim has been to design a framework which will help develop flexible learning environments and design meaningful e-learning experiences. The model has also been called an octagonal framework of e-learning according to the number of dimensions in the model. The eight dimensions are pedagogical, technological and interface design, as well as, evaluation, management, resource support, ethical and institutional dimensions. According to Khan the dimensions are interrelated and interdependent. Instead of e-learning as a core concept in the framework (Khan 2005b, 14) Khan has used other concepts in different contexts such as: web-based training (Khan 2001), blended learning (Khan 2005b, 207) and flexible

learning (Khan 2005a; Khan 2007), while the basic arrangement of octagonal dimensions has been preserved unchanged (figure 1).
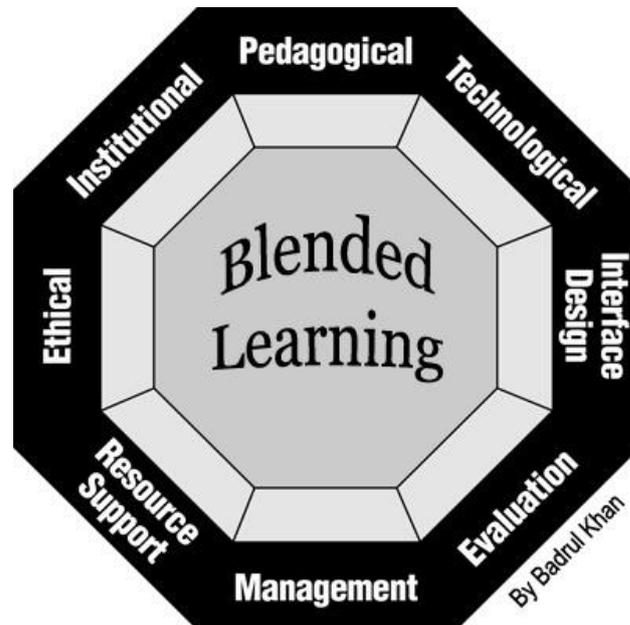

Figure 1. Badrul Khan's octagonal framework of blended learning design (Khan 2005b, 207)

Khan´s framework was not applied as a planning tool when developing the course of Vocational Pedagogy. Instead, in this article the different dimensions of the framework will be used as the organizers of describing the principles in course design.

Pedagogical dimension of the course design

> *"The pedagogical dimension of e-learning refers to teaching and learning. This dimension addresses issues concerning content analysis, audience analysis, goal analysis, media analysis, design approach, organization, and learning strategies."* (Khan 2005a; Khan 2005b, 15.)

In the pedagogical design of the Vocational Pedagogy course, attention was given e.g. to modelling the learning entity, recognizing the core contents and planning the methods of learning and teaching. Especially where long-term learning is concerned, the educational designer is supposed to be capable of planning comprehensive entities and action models connected to them well in advance. In online design it means that such practices which in on-campus learning are considered self-evident must be made visible (Beetham & Sharp 2007, 6). In this study efforts have been taken to make transparent different solutions connected to contents, teaching methods and technical problems by modelling them. The reason for modelling has been to illustrate what kind of significance is given to different solutions concerning contents, methods and technical approaches to the course entity.

The pedagogical modelling of the present course Vocational Pedagogy was started with planning the division between on-campus and online learning in relation to organizing learning experiences and with anticipating the relationship of studying on the e-learning platform and real-time web-seminars during the course. At the same time decisions concerning the timetable were made. In the beginning three on-campus days were reserved. Two of them were to act as orientation days and the third as the final seminar at the end of the course. Between the on-campus days, time should be given to guided work in a virtual environment. Online studying can be characterized by working in different asynchronous virtual environments, but on the other hand, it is marked by four joint real-time web-seminars by the group to promote learning. The implementation of the entire course would be modelled in the form of the following figure (figure 2).

Orientation period
(on-campus)
- 2 days,
8 h + 8 h

21.-22.5.2007

Supervised work in virtual environment
23.5 - 7.10.2007

Real-time web seminars
(at 16.30 – 19.00)
- 4 x n. 2,5 h

4.6   20.6   12.9   27.9

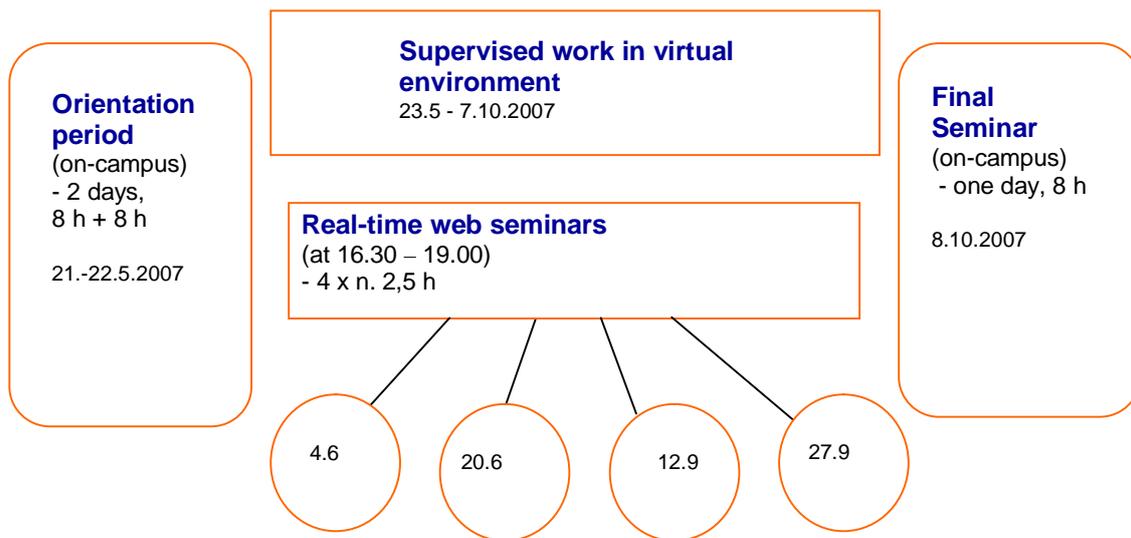**Final Seminar**
(on-campus)
- one day, 8 h

8.10.2007

Figure 2. Modelling of the whole course

The next phase was planning the contents of the course. This meant recognizing and synchronizing the core contents of the course with the aims. Since the studies of the students and student groups were organized according to these core contents, their definition was centrally important. The course was designed with four main areas of contents: 1) teacher´s profession in the vocational field; 2) different teaching methods; 3) planning and evaluating teaching, and 4) special fields of a vocational teacher's profession. The main idea was to organize the small groups to work online on the assignments connected to these main areas. The students were to work in groups of four or five persons, each with appropriate tasks on the content areas. For instance, for the first assignment, a teacher's profession in the vocational field, one group was to examine the theme from the viewpoint of vocational institutes, another from that of universities of applied sciences, and the third from that of vocational adult education. In addition to the tasks mentioned, the students had to produce assignments on the relationship between vocational education and work life. This task would be under examination throughout the studies.

In addition to the group tasks, the students had to produce an individual learning portfolio in the same way as in the conventional course design. For individual supervision and collective reflection in the blended learning, provisions were arranged

in the final seminar. So, when the core contents of the course had been recognized, the modelling of the content-based implementation within the course entity was outlined (figure 3).
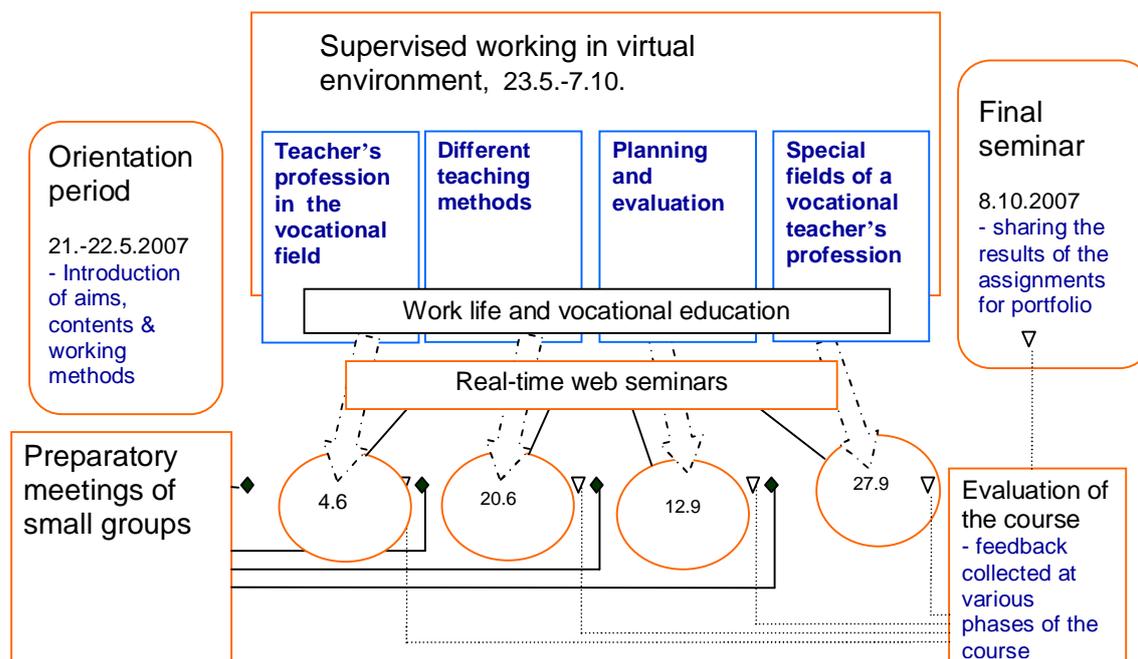

Figure 3. Content-based modelling of the implementation of the course

The next step was to design the pedagogical choices as well as teaching and learning methods for the course. Instead of teacher-centred methods the aim was to choose the online studies and reflection of 4 to 5 person small groups. The methodological choice was that of problem-based learning (PBL) in which the learning process could be based on working life oriented, relevant, authentic problems. The students should try to solve the problems through the methods of collaborative problem solving, reflection on their experiences and engaging in self-directed inquiry. The teacher or tutor could also participate in directing the learning process, and usually several different text-based resources were available during the phases of the process (Hnelo-Silver, Duncan & Chinn 2007). Essential in the PBL was thus to foster students´ collaboration with each other, sharing information, seeking solutions and exploring alternatives (Merrill 2007). The implementation of the course reported here was supported by the basic ideas described above. During their studies the students had to work on tasks based on their assignments connected to a vocational teacher´s work. When planning the program it is important to regard the tasks as thematic areas within which the student groups make collaborative inquiry and try to solve the problems connected to the tasks. The working of the student groups was supervised by two tutors, and the students were also provided with stimulating questions and various supportive resources.

Another central method in the course was cooperative learning, the so-called jigsaw method. It was developed by Professor Elliot Aronson and his college students in the beginning of the 1970´s. According to it the participants work first at home or in jigsaw groups in which they decide about sharing the task. During the process the participants proceed in seeking for more knowledge in the so called expert groups. Later on they

return to their home/ jigsaw groups in which they share their expertise with each other. Singular members of the group represent thus different expertise areas (Aronson, Blaney, Stephin, Sikes, & Snapp 1978; Aronson 2008).

Traditionally the jigsaw method has been applied in contact teaching. For that reason benefiting from it in virtual environment presupposed careful planning. It was necessary to design the jigsaw implementation especially with synchronous and asynchronous e-learning software. The work of the expert groups was planned to be carried out in four groups, each of them having their own thematic areas to be acquainted with in two weeks. The work was to be designated by individual work and expert group online meetings aided by TeamSpeak or Skype software. During this period the groups were also to work on the materials connected to their own thematic areas on the WebCT learning platform. The work of home/ jigsaw groups, again, was planned to take place in real time web seminars with the help of Marratech program. Three separate seminar rooms were introduced to Marratech for the working of jigsaw groups so that the plan supposed three simultaneous jigsaw web seminar sessions.

As to other teaching methods, conventional group work was also included in the plans of learning different themes, as well as, the so-called snowball method in connection with the assignments concerning the relationship between working life and vocational education.

The pedagogical theories behind the decisions concerning the choice of teaching and learning methods were made transparent by modelling the pedagogical implementations of the course during the online process (figure 4).
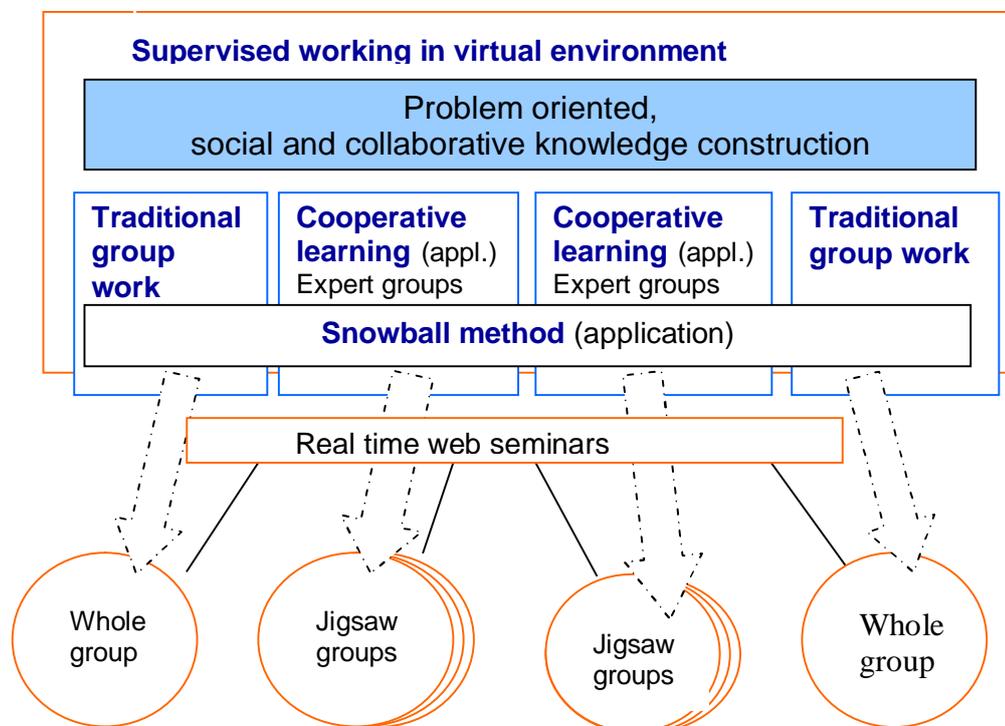

Figure 4. Modelling the pedagogical implementation of the course

Technological dimension of the course design

"The technological dimension of e-learning examines issues of technology infrastructure in e-learning environments. This includes infrastructure planning, hardware, and software." (Khan 2005a; Khan 2005b, 15.)

In a sense, the starting point of the course design was to get acquainted with different technical ways of implementing the course. Among various technical tools only WebCT e-learning platform, now called Blackboard, was familiar beforehand. On the other hand, running the course was considered to need such software tools which would make it possible for the participants to create various real time learning situations during the course. Consequently, before planning the contents and pedagogy of the course, different technical methods of implementation were practised to make them familiar, viz. audio conferencing solutions like TeamSpeak and Skype –software as well as videoconferencing solutions like Festoon (which made it possible to have videoconferencing with Skype) and Marratech. The evaluation software ZEF was also made accessible. It was planned to be used in the context of the course.

While connecting the exercises with software, the participants were made familiar with the qualities of the software and tools. Answers were sought e.g. to questions concerning the characteristics of the tools / software, of the team work, of sharing documents and so on. At the same time efforts were made to arrive at the conception of the applicability of different software and tools in teaching and learning. When the contents and pedagogical measures of the course were defined more precisely, the use and applications of different software in different phases of the course were planned (figure 5). Thus the pedagogical solutions of the course actually defined the most meaningful usage of the software in running the course.
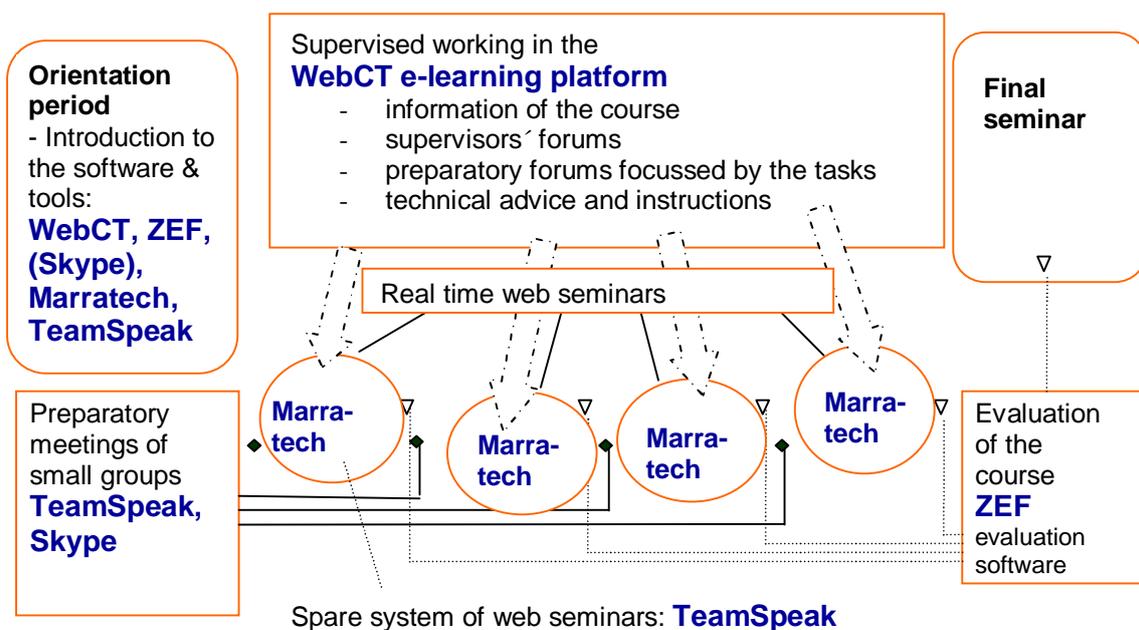

Figure 5. Modelling the technical implementation of the course

The students were given instructions beforehand concerning the technical properties of the student computers as well as instructions concerning the software. They were also given preliminary tasks connected to the technical preparation such as adjusting the headset microphones and installing the Skype and TeamSpeak-client software. In the the orientation period the students were made acquainted with the course software and tools (TeamSpeak, Marratech, WebCT, ZEF) at their disposal. Before actual online seminars the students were given the chance to test different audio and videoconferencing software through their own home computers. The aim of all these technical instructions and software tests was to create a learning environment which could have its focus on actual learning during the course.

Interface design dimension of the course design

> *"The interface design refers to the overall look and feel of e-learning programs. The interface design dimension encompasses page and site design, content design, navigation, accessibility, and usability testing."* (Khan 2005a; Khan 2005b, 15.)

Interface design dimension was central in the course. The importance of the WebCT e-learning platform is essential, since it is the "home" of the course, showing the whole of the implementation, basic information, instructions in different phases of studies and for the usage of different software, as well as the evaluation criteria of the course. The overall look of the course was introduced to the students in the WebCT environment with the help of the models to be described in this chapter. The purpose was thus to help the students to visualize the total continuum of the course through modelling.

One of the basic ideas in designing the e-learning platform was to make the structures in the WebCT environment to follow the progress of student work. This meant organizing the WebCT environment according to the progress logic of the course. Consequently, the home page of the WebCT environment was structured according to the core contents and student assignments. (Assignment 1: Teacher's profession in vocational field; Assignments 2-4: Teaching methods and other core skills of teaching; see figure 3.)

Task-based learning platforms were designed for small groups to include all assignments in the WebCT learning environment. The task-based learning platforms included, concerning every assignment, the following items: 1) Information on the task for the small group, 2) stimulating questions connected to the task, 3) Sources of information connected to the theme, 4) Private forum of each small group offering it a chance to prepare the presentations and brainstorming, and 5) A public forum shared by all the groups and meant for the delivery of prepared presentations before the web seminar. This aimed at creating a WebCT environment constructed according to the pedagogy of implementation. In its construction it was supposed that structuring the environment according to the proceeding logics of the assignments and tasks would enhance the usability.

Resource support dimension of the course design

> *"The resource support dimension of e-learning examines the online support and resources required to foster meaningful learning."* (Khan 2005a; Khan 2005b, 15.)

Considering the measures in supervision and support, the target of planning the course was to offer supervision of both an "automated" and personal tutor. The planning was influenced by the idea developed by Albert & Thomas (2000) of an automated tutor. Its basic principle is "the automated tutor directs the student through a set of resources that aids her or him in completing a specific assignment" (Albert & Thomas 2000). The course called Vocational Pedagogy had as its working principle to offer the students opportunities to easily find help for carrying out assignments by providing resources for them in the learning environment. When preparing the course efforts were taken to direct resources in the designing of detailed instructions and online resources. In the context of task assignment a number of stimulating questions, spurring material choices and different web and other content-based resources were designed for the students.

Support resources designed for the WebCT environment, the automated tutor of the course can in their part offer students help in preparing for the assignments. Rather than finding answers to all stimulating questions or getting acquainted with all the resources in the environment, student groups should define their viewpoints in approaching the task and the sources of information. They were recommended to benefit from their own experiences of teaching and work life in working on their tasks or to interview experts on the theme, e.g. the teachers in the vocational field.

While planning the course the supervision of small groups by the tutors was taken for granted. The role of the two tutors was to supervise the work of the small groups both when preparing the tasks and in web seminars. During the preparation phase they were to supervise the work of the groups in the discussion forum of the WebCT and to participate in the planning sessions of the groups when necessary in TeamSpeak or Skype environments. The tutor´s task has also been to give pre-advice for action in real time web seminars. The emphasis in actual web seminar work was intended to be in the dialogue and interaction of the students. The role of the tutor was to be one of the participants in the discussion.

Considering the technical supervision and support, the course can be regarded to have had both automated technical support and personal technical support. As stated in connection to the technical dimensions, several instructions were composed in the learning environment and links created to guides to be used in different software. They were supposed to help students in introducing the software and in possible technical problems. The course participants were also advised to contact the technical support staff if needed.

Evaluation dimension of the course design

> *"The evaluation of e-learning includes both the assessment of learners and the evaluation of the instruction and learning environment."* (Khan 2005a; Khan 2005b, 15.)

For learner assessment the course had proper content-based evaluation criteria which had been developed specially for the course in question and which were accessible by the students in the WebCT platform. When the evaluation criteria are transparent, they can possibly direct and guide students during the studies.

For the assessment of the implementation, evaluation forms were designed in which the students were asked about their conceptions of the contents and methods of the course, of the technical realization and the chosen software. In addition, the students were asked to evaluate the work of different groups during the process. Evaluation of the process was planned to be collected several times during the studies. This might make it possible to develop the studies further on. The first feedback was planned to be collected in connection with the orientation period, when the students could also get acquainted with the ZEF evaluation software. Moreover, the feedback was planned to be collected after the web seminars and, to sum up all the study process, in the final seminar.

Management, institutional and ethical dimensions of the course design

> *"The institutional dimension is concerned with issues of administrative affairs, academic affairs, and student services related to e-learning."* (Khan 2005a; Khan 2005b, 15.)

> *"The management of e-learning refers to the maintenance of the learning environment and distribution of information."* (Khan 2005a; Khan 2005b, 15.)

> *"The ethical considerations of e-learning relate to social and political influence, cultural diversity, bias, geographical diversity, learner diversity, the digital divide, etiquette, and legal issues."* (Khan 2005a; Khan 2005b, 15.)

The three dimensions of the title were not consciously meaningful in developing the contents and measures of the Vocational Pedagogy course. For instance, the institutional dimension in Khan´s report (2005, 23) refers to the influence of institutions behind the holistic design of online learning. This kind of holistic strategy of thinking was not of concern in the course in question, but rather the implementation was based on the developmental work of single teachers. On the other hand, the Vocational Pedagogy course had access to various student support services, as well as to the WebCT learning base support services offered by the University of Applied Sciences so that in this respect the institutional measures supported the realization of the course.

Similarly, many responsibilities connected to the management dimension were taken for granted in the planning phase, for example as to the nature of the software. Concerning WebCT and TeamSpeak services the information services of the Oulu University of Applied Sciences was responsible for the server maintenance. On the other hand, the main responsibility of the management in practical implementation was clearly the teachers´ duty.

Neither was the ethical dimension consciously included in planning the Vocational Pedagogy course. On the other hand, the equity of student accessibility to studies,

irregardless of which corner of the country they come, was one of the basic ideas of the course planning. In this respects the course design gives attention to the geographical diversity of the students which Khan (2005b) mentions as one of the significant issues in the ethical dimension. Also the jigsaw technique used in the course of studies contains features which the developer of the technique, Elliot Aronson (2008), regards as developing the mutual equity of the students, when they share the learning processes in heterogeneous groups. In Vocational Pedagogy, heterogeneous groups were formed according to the backgrounds of the students so that each specialist group should contain expertise from different fields, e.g. from business, enterprises and vocational education. The principle in forming the groups was not, however, ethical. Diversity was the main strategy, since it was considered to benefit learning, when the group members inquired and solved problems from different viewpoints.

Conclusion

In this article blended learning design was evaluated with the help of Khan´s octagonal framework. As Khan (2005a) has stated, the dimensions of the framework are interrelated and interdependent. In planning the Vocational Pedagogy course this mutual interrelationship of the dimensions seemed to especially emphasize the pedagogical dimension. It was a core dimension of planning. Its solutions influenced those of the technological dimension, interface design dimension and resource support dimension. This seems understandable, for as Nichols (2003) has stated, the way of using ICT should reflect in the choices of pedagogical implementation of the study unit. The characteristics of technology and different e-learning environments should thus be subordinated to pedagogical thinking in the fulfilment of studies.

This article emphasizes the models of blended learning design in planning education. It presents, e.g., that choosing different pedagogical solutions and using different teaching and learning methods are possible in e-learning, in the case that they are preceded by good planning. As Beetham and Sharp (2007, 6) have stated, the planners of e-learning environments should be able to clearly express what the teachers and students are expected to do during the studies. In online learning the students should know beforehand, for instance what phases the learning process contains, what kind of tasks and assignments are connected to the studies, what kind of methodological solutions are used to organise the studies and what kind of content-based and technological support are available. In this course design, the starting point was to make the action models of the course realization visible. It led to modelling and phasing the whole entity, to content-based modelling of the implementation of the course, to modelling the pedagogical implementation of the course, modelling the technical implementation of the course, outlining the steps of single tasks and planning support and supervision. From the students´ point of view modelling helps them to become aware of the whole entity of the course and of the significance of different solutions concerning the contents methods and techniques of the entity. From the viewpoint of course planning, modelling refers to the fact that planning does not apply only to single lessons or proceedings in e-learning environment but attention is given to the general planning of the whole entity.

References

Albert, S. & Thomas, C. 2000. A new approach to computer-aided distance learning: the 'automated tutor'. Open Learning 15 (2), 141-150.

Aronson, E. 2008. Jigsaw classroom. Social Psychology Network. Professori Elliot Aronsonin yhteistoiminnallista palapelitekniikkaa koskevat kotisivut. Saatavilla URL: http://www.jigsaw.org/ Luettu 16.6.2008.

Aronson, E., Blaney, N., Stephin, C., Sikes, J. & Snapp, M. (1978). The jigsaw classroom. Beverly Hills, CA: Sage Publishing Company.

Beetham, H. & Sharpe, R. 2007. An introduction to rethinking pedagogy for a digital age. In H. Beetham & R. Sharpe (eds.) Rethinking pedagogy for a digital age. Designing and delivering e-learning. London: Routledge, 1-10.

Hmelo-Silver, C. E. Duncan, R. G. & Chinn, C. A. 2007. Scaffolding and achievement in problem-based and inquiry learning: a response to Kirschner, Sweller, and Clark (2006). Educational Psychologists 42 (2), 99-107.

Khan, B. H. 2001. A framework for Web-based learning. In B. H. Khan (ed.) Web-based training. Englewood Cliffs, NJ: Educational Technology Publications, 75-98.

Khan, B. H. 2005a. Learning features in an open, flexible and distributed leaning. AACE Journal 13 (2), 137-153.

Khan, B. H. 2005b. Managing e-learning: design, delivery, implementation and evaluation. Hersey, PA: Information Science Publishing.

Khan, B. H. 2007. Flexible learning in an information society. Hersey, PA: Information Science Publishing.

Littlejohn, A. & Pegler, C. 2007. Preparing for blended e-learning. London: Routldege.

Merrill, M. D. 2007. A Task-centered instructional strategy. Journal of Research on Technology in Education 40 (1), 33-50.

Nichols, M. 2003. A theory for eLeaning. Educational Technology & Society 6 (2), 1-10.

Oliver, M. & Trigwell, K. 2005. Can 'blended learning' be redeemed? E-learning 2 (1), 17-26.

Singh, H. 2003. Building Effective Blended Learning Programs. Educational Technology 43 (6), 51-54.