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Problem Oriented Project Work in a Distance Education Program in Health Informatics.

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Abstract

At Aalborg University, an important part of the distance education program within Health Informatics is problem oriented project work. Traditionally, distance education has been characterized by one-way communication and self study whereas the problem oriented project study form is based on cooperation and dialogue. In this paper, we describe the way in which we have implemented the problem oriented study form in a program within Health Informatics which is based on distance learning. First, we describe the program with regard to student, structure, aim, and activities. Second, we introduce the problem oriented project study form and present the basic principles behind this approach. Third, we explain important concepts and distinctions within the area of distance education. Finally, we describe the way in which we try to put the ideals of the problem oriented project work into practice. The use of a computer conferencing system is essential but in our experience, it is not in itself sufficient to provide the necessary support for the student project work.

Keywords

Problem Oriented Project Work; Distance Education; Health Informatics

Introduction

Several definitions of Health Informatics have been proposed over the years [1, 2, 3, 4,] as well as there has been a lot of discussion and debate on whether Health Informatic can be considered as a separate discipline/ science or not [5, 6]. However, there seems to be an agreement that Health Informatics is a wide-ranging area that is concerned with the use of computers in the field of health care. Thus, the health informatician has to work with a variety of problems and furthermore has to cooperate with different professions in different contexts. The problem oriented project organized study form aims at strengthening the students' ability to work with problems within different contexts.

Health Informatics at Aalborg University

Health Informatics at Aalborg University was initiated in 1994, and, so far 58, students successfully has completed the study and received a diploma. The program is offered through Open University and the study load corresponds to a half time study. The program has a duration of two years, and it is open to students who already have a degree. This includes students with academic degrees, such as doctors, computer scientists, or engineers, and students with a vocational training such as nurses, physical therapists, and midwives.

A major part of the program is based on distance learning. The students are gathered at the university four times a year for intensive lectures, laboratory exercises, as well as oral discussions. The rest of the time, the communication between the participants (i.e. students, teachers, and administrative staff) is mediated through a computer conferencing system.

The aim of the program is:

- to enable the student to critically appraise and assess the possibilities and limitations of application of information technology within health care
- to qualify the student to take active part in the planning, development, and implementation of information systems, and to organize the division of labor in relation to the practical use of such systems
- to qualify the student to analyze and handle information within health care on a basis of theories and methods from areas such as biomedical engineering, computer science, organization, communication, and cognition.

To achieve this, the student has to work with two main types of activities: courses and project work. A course is a systematic presentation of a discipline. The purpose is to provide the student with sufficient disciplinary knowledge to cope with interdisciplinary problems.

The courses comprise: Formalization and systems development; Signal-capture and signal analysis; Introduction to databases; Decision support systems; Application of informatics in clinical health care and health care administration; Human-computer interaction; Applications of information systems for quality assessment and assurance; Technology assessment and evaluation of information systems within health care. The courses are evaluated in exams performed through the computer conferencing system.

During the program, the students write two projects, one per year. The first year, the project is made under a theme called "Application of information technology in health care", and the second year, the theme is "Information technology in the health care sector from a developmental perspective". Within this framework, the students formulate a problem which they want to examine and solve, and which is used to guide the learning process. Examples of projects are: "Quality assessment: Integration of the patient perspective", "Usability engineering used in the development of the electronic patient record", "Determination of the requirements of a system used for the registration of time and staff in anesthesia", "Implementation of a laboratory information system".

The result of the project work: the project report, forms the basis for an examination of this part of the study work. The examination takes place at the university as an oral presentation and discussion between the students, the teachers, and the external examinators.

Further description of the program can be found in [7, 8, 9], and a specific description of the remote evaluation of the courses is made in [10]. At the moment, we are working on an extension of the program in order to reach master level.

The problem oriented project study form

The problem oriented project study form is an alternative to the traditional university pedagogy building on lectures, distribution of information, and independent study. The problem oriented project work takes its point of departure in the problem. The problem can be expressed as a conflict, a contradiction or perhaps as a wish for change. Different theories and methods are relevantly applied in order to specify, explain, and to solve the problem at hand. Acquisition and use of theories and methods in the work with the problem (ideally) lead from subjective experiences to an objective understanding and further to concrete actions.

Historical roots

The problem oriented study form is rooted in critical theory and, in particular, in the work of the German philosopher and sociologist Oskar Negt. Negt's work in the area of learning is connected to his proposal of a renewal of the education program in the trade union, but also connected to the more general concepts of experimental learning and self-regulation [11]. Negt's work gained a lot of interest in Denmark and the problem oriented project study form was developed under this inspiration. It was implemented as a framework for learning when Aalborg University was established in the beginning of the 1970's. More than twenty years of experience with this study form has moved the problem oriented project work from an abstract pedagogical idea into a concrete pedagogical practice. The study form has also proved to work well, offering high rates of accomplishment at a satisfying level of qualification.

The basic principles

Problem oriented project pedagogy is based on the principles of problem orientation, participant control, interdisciplinarity, and project organization [12,13,14].

Problem orientation means that the pivotal point in the learning process is the problem and not the subject. It means that the content and focus of the study are not defined solely in terms of academic disciplines, but in terms of personal, social, and scientific problems. A problem is an anomaly; something that deviates from ordinary norms of behavior; something unusual.

Participant control means that choosing the subject matter in important parts of the study is on the initiative of the students. In a broader perspective, this brings dynamic aspects to the education, because the students are concerned with new and challenging problems. Particularly when the student already has a professional degree, the problem oriented project study form is a support in bridging the gap between professional experiences and academic knowledge. Thus, the student in Health Informatics at Aalborg University often choose to work with problems which have a close connection to the problems they experience in their professional work.

Interdisciplinarity means that insight from different scientific disciplines is integrated in the study of specific problems. Seen from the perspectives of the students who also work as professionals, this is an ideal approach, because real-life problems are interdisciplinary. The principle of interdisciplinarity calls for a dynamic relation between project work and subject work because the student need some basic knowledge on the subject area in question in order to perform interdisciplinary work.

Project organization means that the work with the problem is organized by a group of student in projects. The members of the group have to learn to work together, to make decisions collectively, to make a division of the labour, and to coordinate, etc. By making several projects, the students develop qualifications in connection with formulation, planning, management, and evaluation of projects. Besides, the students acquire a number of techniques and methods which are essential in connection with handling information and skills at processing and analyzing problems at different levels.

Points of distinction

The problem oriented project study form differs from a traditional approach in two important aspects: content and control. The determination of the content is guided by the problem and not by the curriculum. The student controls the learning process and the role of the teacher is to act as a guide and an instructor. The difference can be depicted as in figure 1.

Thus, the students have to be responsible for their own learning process. The problem oriented project study form assumes that learning is an active construction process; and not a passive consumption process, that learning is also a social process and not just an individual one. Furthermore, this study form encourages the students' ability to cooperate and their ability to organize the work with problems which have unknown solutions within a definite time limit.

Education



Figure 1 - Points of distinction

Distance education

Distance education simply means that there is a distance (in space and time) between the student and the institution that offers the education. In this sense, distance education has existed for a very long time. The emergence of a more formally organized distance education, however, is naturally connected with the development of communication technologies. The technical characteristics of distance learning have been described from the perspective of generations of distance education technology [15]. Thus, the terms first, second, and third generation distance education refer to communication by mail, by telecommunication, and by computer communication. As for the first and second generation distance education, the main focus was on the production and distribution of learning material to the student. The communication between the student and the teacher was rather limited and the communication between one student and other students was almost non-existing.

First and second generation distance education has also been characterized as the industrial approach to education [16] meaning that rationalization and mass production is in focus. In this approach, education is perceived as a standardized product and the aim is to make this product accessible to as many "consumers" as possible with the most efficient use of resources. Broadly speaking, distance education has been equaled with this industrial approach to education. This view on education is of course not compatible with the problem oriented project study form. The industrial approach is succeeded by the postindustrial approach, where two-way communication and collaboration are emphasized. This approach is connected with third generation distance education based on computer communication.

Problem oriented project work in a program within health informatics

It is a challenge to apply a study form which highly depends on cooperation and dialogue when the students are spread across the country and when they do their study work at all hours. But with the use of a computer conferencing system combined with structured face-to-face seminars, we believe it is possible to support this kind of study work. As mentioned, the program of Health Informatics at Aalborg University is organized with four weekend-seminars, where the students are assembled at the university; and in-between periods; the students communicate with each other, with the teachers, and with the administrative staff through the computer conference system FirstClass.

The conference system

FirstClass provide facilities for organizing and structuring group communication. The basic unit is a conference, and a topic and a number of members define a conference. The members may have different types of roles, e.g. controller, contributor, reader, etc. Each conference contains the total amount of messages sent to it by the members. Although on-line chat is possible, the conference system is characterized by an asynchronous text-based communication. Thus, it is not required that the members are present and active at the same time.

The conference system also provides some facilities to support the communication. For example, it is clearly indicated if there is any new messages. Furthermore, it is possible to see who is on-line right now, who, besides yourself, is a member of a particular conference, who has read the messages in a conference, when was the last time a person joined the system, and so on. Additionally, the system can be used as an ordinary mail system and furthermore you can mail to, and receive mail from, the internet.

In our program of Health Informatics, we have a conference for each course and the members are the students belonging to one class. We have different course conferences for different classes. We have conferences assigned to project work, where the members are those students who work together in a project. We also have conferences where all students and teachers as well as others connected with the program of Health Informatics can discuss a topic of specific interest; e.g. the computer based patient record. We have conferences, which function as bulletin boards, and there are conferences for technical support which are common all users of the system. It is possible to establish conferences as you may need them. The system administrator sets up some of the conferences, others by teachers and students. In general terms, the conference system functions as a discussion forum and as a document store.

Experience with problem oriented project work

The work with the project consists of four phases:

- The formulation of the problem
- The investigation/research process
- · The production/writing and editing process
- The evaluation

In the first phase, the student has to agree with a certain number of other students on a topic of relevance to the overall theme, and then establish a project group. Then, they will make the initial formulation and analysis of the problem and they will discuss and decide on which theory and method that would be suited for the work with the problem at hand. In the following investigation process, the focus is on the comprehension and especially on the use of theories and methods. The third phase is concentrated on producing the report, and the fourth on the evaluation process. All the way through, a supervisor guides the group.

First year - initial difficulties

At the first weekend seminar, the problem oriented project study form and the theme for the first year were introduced to the students. After the introduction, we had a brainstorm session with the purpose of supporting the students in coming up with possible ideas for concrete projects. This resulted in a wide range of proposed topics which were briefly discussed and grouped in different groups according to similarity. It was decided to set up a conference for each topic groups. And these conferences were accessible to all students. The intention was that the student should continue the discussion in the conference system, and, through this, become ready to choose a topic and form a project group at the second seminar. This did not happen and when we met at the second weekend seminar, the students had made no progress. This lack of activity was caused by a variety of problems of which the most important were:

- the installation and use of the conference system
- the limited communication possibilities
- · uncertainty with regard to study form
- · uncertainty with regard to the subject matter
- lack of acquaintance with the other students and the teachers

Although the problems were solved and most of the students succeeded in finishing the project work, it was clear that more support was required, in order to make the problem oriented project study form effective.

Second year - pilot project

The second year, we introduced a pilot project, which was started at the first weekend seminar and finished at the second. Similarly to the first year, we had an introduction to the study form and the general theme for the project work. But after the introduction, the students were placed in groups of four or five, and student who lived near each other were placed in the same group as far as possible. The students were asked to prepare a report (2-3 pages) to be handed in before the second weekend seminar. The report should include a formulation of a problem to work with, an outline, and a list of relevant literature. The pilot project had a fixed topic (the computer-based patient record) and we gave various material and lectures on the topic at the first weekend seminar. The purpose of the pilot project was to familiarize the student with the problem oriented project study form, with each other, and with the conference system.

The pilot project was a success. The students realized more quickly than the first year how to work with problems, and, in the same way, they learned more quickly how to use the conference system. They became acquainted with some of the other students and they had some of their opinions about health informatics tested in discussions. Thus, when we met at the second seminar, the students were better prepared for choosing a topic and forming a project group.

Third year - project seminar

Project seminars were introduced as a way of supporting the students planning of the work and also to advise on how to use the teachers in project work.

We have three project seminars in one year. The participants in a project seminar are students and teachers from two different groups. A project seminar has a duration of one and a half hour; thus, each group has 45 minutes to present and discuss their own work with the teachers and with the others. The seminars are organized around the three first of the four phases in the project work mentioned above (that is: the formulation of the problem, the investigation/research process, and the production/ writing and editing process). This explicate the structure and help the students in planning the project work. Additionally, the seminars force the students to hand in papers earlier than usual, and, in turn this means that the teachers are brought in earlier and on a more concrete basis.

Further consideration

In our experience, it is of decisive importance for collaboration through the conference system that the students know each other and that the task they work with is well defined. It is very difficult to make decisions at a distance, albeit easier to realize them. In the conference system, the communication is limited to the written language. The spontaneity and the possibility of immediate feed back that characterize a face-to-face conversation is lost. On the other hand, written communication is permanent and it is easier to keep track of the discussions. An effective use of the conference system is also a question of knowing what kind of communication is suited for the asynchronous text-based form.

Conclusion

We find that the problem oriented project study form is well suited for the education as a health informatician especially if the students also work as professionals, which is the case in our program. In general, the students learn how to define, analyze, and solve problems and the students often use the opportunity to bring in real-life problems to work with in their study. Distance education also seems to be a god idea because it gives you the flexibility in time and place that is needed when the students make a part-time study. Traditionally, there has been a conflict between problem oriented project work and distance education but with the use of computer conferencing and face to face seminars, we believe it is possible to overcome this contradiction. As answers to some of the difficulties we met, we introduced the pilot project and the project seminars.

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