

**Thematic Modules in an Asynchronous Learning Network:**  
*A Scandinavian perspective on the design of introductory courses*

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**Abstract**

This paper discusses an educational philosophy and proposes a framework for structuring introductory courses in higher education. The philosophy is rooted in a Scandinavian tradition of social settings. Two elements are central in the philosophy: First, the notion of a thematic module (TM) which is a unit for studying a limited subject matter or topic. Second, asynchronous learning networks (ALN), which is the use of computer mediated communication for time and place independent collaborative learning. To evaluate the philosophy, a course, “*Introduction to Informatics*,” was designed and offered to forty-three business administration majors. Three central assumptions of the philosophy guided the design and evaluation of the course. First, thematic modules are appropriate for structuring an introductory course, second, asynchronous learning network is a viable environment to enhance thematic modules, and third, TM in ALN is a suitable approach for educators who wish to engage students and fellow educators in constructive and collaborative learning activities. To investigate the assumptions, both qualitative and quantitative data were collected and analyzed. The quantitative data gathered are very limited, but give indication for further research. The paper ends with a tentative framework for design of introductory courses using TM and ALN.

**Keywords:** Thematic modules, asynchronous learning networks, introductory courses, course structuring, constructivism.

## **1 Introduction**

Many educators believe in the immense potential of information technology (IT) and computers as learning tools. However, vital aspects are often neglected in these rather technology intensive discussions. To realize the potential of computers and other information technology, as tools for teaching and learning, we have to reconsider what we teach as well as how we teach. But most of all it is necessary to revise our understanding of how people learn.

Current transition to post-industrial society, information society, learning society, digital society or whatever we decide to call it, clearly reflects a change in what knowledge people should have in order to be capable actors in this new society. The question then is whether education, and especially higher education, is adapting to this change? The notion of life long learning, and learning to learn is as important in formal education as the task of acquiring the knowledge itself. From a pedagogical perspective, a (radical) change of educational practice is necessary to meet the demands from the new society.

The research is conducted in Scandinavia, where research on IT has certain characteristics that can be summarized in two main points. First its context as it is situated into a societal setting with democracy, special labor-market relationships, a concern for ethical issues, and a tradition for design of IT artifacts. Second, its diversity as there are many competing approaches mixed with openness and mutual respect. In Scandinavia, pedagogical research has a history of mainly quantitative research. This changed as phenomenography later came to be a main methodological approach. Marton (1992, p.253) describes phenomenography as a research approach for describing the limited number of qualitatively different ways in which a phenomenon is experienced, conceptualized, or understood, based on an analysis of accounts of experiences as they are formed in descriptions produced in research with other people. These characteristics of IT as well as pedagogical research influenced this research to a large extent.

The central concept in this paper is thematic modules (TM) which is the notion of structuring a course in self-contained and content-based modules focusing more intensively on process than on product. This is further discussed in section three. A second central aspect is the use of information technology in education. This is a frequent field of research and until recently, research examining classroom use of computers consisted almost exclusively of

experiments examining a specific application of a computer based instruction, video disk or interactive video (Leidner and Jarvenpaa 1993). The interest has been focused on the interaction between the student and some kind of computer artifact e.g., a software application. The focus is slowly changing towards computer mediated interaction and communication among students, and among students and teachers. The Virtual Classroom, learning environments and learning communities are notions commonly used in this form of education. Numerous universities have designed and developed their own applications of computer supported learning environments (see for instance Harasim, Hiltz et al. (1995) for a summary). Commercial products such as Lotus Learning Space and First Class are gaining popularity among educators, and there are also other World Wide Web-based alternatives. These environments are often referred to as Asynchronous Learning Networks (ALN). A central pedagogical as well as practical idea among the users of ALN's is collaborative learning at the time and place of the individual student convenience (Hiltz and Wellman 1997).

This paper discusses an educational philosophy with two central concepts—thematic modules and asynchronous learning networks. The philosophy was applied to design an “*Introduction to Informatics*” course stretching over ten weeks. Forty-three MBA students at a Swedish Business School participated in the course. The Business School had two requests. Not surprisingly, one was to keep the costs down; the other was that the course should utilize the potentials of information technology. From the perspective of the course coordinator (who also is the author) there were two reasons for applying TM and ALN in the design of this introductory course. First, an introduction to Informatics is requested by an increasing number of students with varied backgrounds. The department of Informatics needs to find an appropriate way to meet this demand. The department needs to find models to scale-up and still be able to offer courses with high quality. Second, our experiences of introductory courses are that students often perceive them as fragmented. A large number of topics and aspects are introduced in a very short period of time in introductory courses but usually very limited time is allocated for reflection. The following three assumptions are the core of the philosophy and at the same time they serve as structure for the research discussed in this paper.

- Thematic modules (TM) are a fruitful structuring philosophy for an introductory course.

- Asynchronous learning networks (ALN) are viable resources to enhance TM.
- TM and ALN are a suitable approach for constructivistic and collaborative learning.

To investigate the assumptions, students and teachers involved in the course were surveyed. Note that this research is not hypothesis testing in the traditional sense. Rather it is a more pragmatic research from a methodological point of view.

The remainder of the paper is organized in the following sections. First, educational practice and technology are discussed. The section covers thematic modules and other approaches to structure educational activity and content. ALN as a concept is described together with a short review of related research. The next section describes the design and evaluation of an introductory course according to the philosophy. The following section proposes a framework for designing introductory courses using TM and ALN. Finally, the last section conclusions are drawn and further research is outlined.

## **2 Teaching, Learning and Technology**

Memorable educational experiences are enriching, engaging and stimulating. Ideally, they help students to increase knowledge and skills, they provide them with a satisfactory feeling of accomplishment, and they challenge their worldview. But establishing an environment that engages students is no easy feat. A teacher centered lecture might be memorable, but challenges from the teacher and interaction among the students are usually more influential for the students learning. In this paper, learning is understood as a change in the way people understand the world around them, rather than a quantitative accretion of facts and procedures (Ramsden 1992). In other words, learning is something students do, not something that is done to them.

### **2.1 Approaches to learning**

A variety of models are used to characterize different paradigms of learning. Being somewhat categorical, these models are often classified as either behavioral or cognitive. The behavioral models are based on Skinner's theory about stimulus and response, whereas the cognitive models are based on cognitive information processing and more recently on collaborativism.

Traditionally the model of choice in education has been the objectivist model of learning (see for instance Leidner and Jarvenpaa (1993)). Basically, facts and information exist out there and the instructor acts as an intermediary who filters, selects and transmits the information to ignorant students. The dominating activities are active teachers presenting information to passive students, through lectures, and written material, such as textbooks. Students then provide the teacher with evidence of learning by recitation, orally or in written exams. At lectures, teachers ask questions and expect the student to provide an immediate answer, which is either right or wrong. The overall objective for the teacher is to produce, in the mind of the student, the necessary body of knowledge.

The objectivist model is criticized for stimulating surface learning (O'Neil 1995), knowledge reproduction and knowledge telling instead of knowledge building (Scardamalia and Bereiter 1993). Knowledge building, on the other hand, is a learning theory which is based on a constructivist/social cognitive worldview where knowledge is constructed as it fits the individuals' experience of the world (Harasim, Hiltz et al. 1995). Moreover, a knowledge building strategy treats the learner as an active participant, interacting with others in the group. This way the learner actively constructs knowledge by formulating ideas built on reactions and responses of others to the formulation into words. Therefore, as an alternative to objectivism, a constructivist model of learning is put forward. The constructivist model stresses the crucial relationship between new experience and what is already known. Learning develops through encounters with new information that is different enough to be stimulating, but not so alien that it can not be assimilated into the learner's mental structures that represent her present state of understanding (Watson 1996). Real learning must build on the students' own knowledge, needs and interests. The objectivist and the constructivist model can also be classified as surface and deep approaches to learning (Ramsden 1992). This is summarized in table 1 below.

<b>Surface learning (objectivistic)</b> - Intention to complete task requirements.	<b>Deep approach (constructivistic)</b> - Intention to understand.
<ul style="list-style-type: none"> <li>- Focus on the signs (e.g., words and sentences of the text, or unthinkingly on the formula needed to solve the problem).</li> <li>- Focus on unrelated parts of the task.</li> <li>- Memorize information for assessments.</li> <li>- Associate facts and concepts unreflectively.</li> <li>- Fail to distinguish principles from examples.</li> <li>- Treat the task as an external imposition.</li> <li>- External emphasis: demands of assessments, knowledge cut off from everyday reality.</li> </ul>	<ul style="list-style-type: none"> <li>- Focus on what is signified. (e.g., arguments and concepts applicable to understand and solve the problem).</li> <li>- Relate previous knowledge to new knowledge.</li> <li>- Relate knowledge from different courses.</li> <li>- Relate theoretical ideas to everyday experience.</li> <li>- Relate and distinguish evidence and argument.</li> <li>- Organize and structure content into a coherent whole.</li> <li>- Internal emphasis: a window through which aspects of reality become visible, and more intelligible.</li> </ul>

Table 1: Different approaches to learning.

Writings on constructive learning have altered in their perspective over the last twenty years to include more than the mental activity of individuals in learning (Watson 1996). Social interaction among the learners is added to the constructivist model and it becomes collaborative. Collaborative learning refers to an activity where two or more people work together to create meaning, explore a topic, or improve skills (Harasim, Hiltz et al. 1995). From a practical perspective, collaborative learning consists of activities using peer interaction, evaluation, and cooperation, with some structuring and monitoring by the educator. This collaborative model of learning has frequently been used as the basis for understanding and exploring learning. The basic premise underlying this is that learning emerges through shared understandings of multiple learners (Leidner and Jarvenpaa 1993). The essence of the model is that active participation is critical to the learning process and that learners have knowledge valuable to other learners. Learning is sharing, and the more that is shared the more is learned. The constructive and collaborative models are combined in a, what we can call, reflective model of learning. From the above, it is claimed that our conception of

learning is changing from behavioral to cognitive and constructive; from individual to collaborative; and from objectivist to reflective.

In the objectivist model of learning the role of the educator is to provide or transmit knowledge. In the constructive and cooperative models, on the other hand, the educator is a facilitator and mediator of the learning process. This is often described as scaffolding which is the educational term that describes this guidance and the support the teacher provides to the learner (Jackson 1996). Clearly, teaching and learning is migrating from teacher centered to learner centered. Let me give a few examples of such activities. First, **problem based learning** (PBL), where “People learn best when engrossed in the topic, motivated to seek out new knowledge and skills because they need them in order to solve the problem at hand. The goal is active exploration, construction and learning rather than passivity of lecture attendance and textbook reading. The major theme is one of focusing around a set of realistic, intrinsic problems” (Norman and Spohrer 1996). Second, **learning-in-doing** (based on Kolb's learning-by-doing) where “Learners are increasingly involved in the authentic practices of communities through learning conversations and activities involving expert practitioners, educators, and peers” (Pea 1993). Third, related to the previous, **experiential learning** where students work in small groups, and what is learned is directly related to what happens in the group and how it happens. Fourth, **open discovery**, where the “Students have responsibility for determining what to learn, as well as when and how to learn it” (Swanson, Case et al. 1991). And fifth, the notion of **the virtual classroom** where the “Computer-mediated environment supports a collaborative learning process that can exceed that of the traditional classroom, a process in which students and instructors are actively involved in creating and carrying out learning activities together” (Hiltz 1994).

These five are claimed to be examples of different reactions to the objectivist model of teaching and learning. Whereas they are different in many ways, they still share some basic assumptions. First, these approaches rely on engaged and motivated students. Students learn when they are engaged in active exploration, interpretation and construction of ideas and products with a variety of resources (Hawkins 1993). Second, it is collaborative learning, which is a highly interactive process with collective responsibility. Third, computing technology is viewed as an important resource in enhancing educational activities. It should be

noted that learner centered approaches are also criticized by both students and teachers. However, this discussion is beyond the scope of this paper.

## 2.2 Curriculum and Structuring of Courses

Designing a good course structure is not easy. Clear (1997) suggests a number of models for curricula integration. Some possible paradigms of structuring an introductory course are given in the ten different approaches to structure a curriculum. Even if the objective of them is to provide structure for larger units than courses, they do provide some valuable input in structuring shorter units such as courses.

The fragmented model	<i>"The traditional model of separate and distinct disciplines, which fragments the subject areas."</i>
The connected model	<i>"Within each subject area, course content is connected, topic to topic, concept to concept, one year's work to the next, and relates idea(s) explicitly."</i>
The nested model	<i>"Within each subject area the teacher targets multiple skills: a social skill, a thinking skill, and a content specific skill."</i>
The sequenced model	<i>"Topics and units of study are re-arranged and sequenced to coincide with one another. Similar ideas are taught in concert while remaining separate subjects."</i>
The shared model	<i>"Shared planning and teaching take place in two disciplines in which overlapping concepts or ideas emerge as organizing elements."</i>
The webbed model	<i>"A fertile theme is webbed to curriculum content and disciplines: subjects use the theme to shift appropriate concepts, topics and ideas."</i>
The threaded model	<i>"The metacurricular approach threads thinking skills, social skills, multiple intelligences, technology, and study skills through the various disciplines."</i>
The integrated model	<i>"This interdisciplinary approach matches subjects for overlaps in topics and concepts with some team teaching in an authentic integrated model."</i>
The immersed model	<i>"The disciplines become part of the learner's lens of expertise: the learner filters all content through this lens and becomes immersed in his or her own experience."</i>
The networked model	<i>"Learners filters all learning through the expert's eye and makes internal connections that lead to external networks of experts in related fields."</i>

Table 2: Ten different paradigms for curriculum design (Clear 1997)

On the other hand, looking at the different activities within the course, table three is a classification of components within a single course (adapted from Collis (1997)).

1	General (enrolling, reading syllabus, obtaining and reading course organizational information; travelling to the course, picking up material, waiting for lectures to begin, etc.)
2	Lectures/Presentations
3	Group discussions/Seminar-style sessions
4	“Learning events” (i.e., field trip, guest lecture)
5	Private communication with instructor and peers
6	Self-study and practice (supervised or non-supervised)
7	Individual project (major course assignment, done individually)
8	Group project (course assignment, done as part of a group)
9	Testing and assessment

Table 3: Components in a course

In this research it is suggested that large introductory courses often are designed according to the sequenced model, with lectures, self-study and practice as the main building blocks. The aim of introductory courses are often to give students the “big picture” or overview of a field. This is questioned by Laurillard (1993) who clearly describes this as an educational problem, which is obvious in introductory courses.

*“The lecturer must guide this collection of individuals through territory the students are unfamiliar with, towards a common meeting point, but without knowing where they are starting from, how much baggage they are carrying, and what kind of vehicle they are using. This insanity. It is truly a miracle, and a tribute to human ingenuity, that any student ever learns anything worthwhile in such a system” (ibid p.3).*

A central claim in this paper is that introductory courses have specific properties no matter what area or topic they are to cover. Our reason is the following properties that we find in introductory courses. Introductory courses are usually large heterogeneous classes. Students have very different backgrounds and their reason for taking the course varies, and they surely have very different levels of motivation. We suggest an alternative view of introductory courses.

It should be stressed that this paper does not suggest a third approach to learning. Rather the aim is the design of introductory courses which engage students in activities with a focus that is moving from the objectivistic towards the constructivistic.

### **2.3 Thematic Modules**

In the research described in this paper, the notion of thematic modules (TM) is used to describe the modular structuring of a course and the course content. A TM is defined as longer than lessons and shorter than a course, and it is suggested that in a content-based approach, the module constitutes the basic unit of study. Content-based modules are useful for experimenting with minimal changes in existing courses and at the same time focus more intensively on process-methodologies. TM can, to some extent, be viewed as a reaction to the fragmented and the sequenced model above.

From a pedagogical perspective, thematic modules share many characteristics with problem based learning (PBL). As in PBL, each TM contains a number of distinct phases. First, there is an introduction of a topic or issue. In PBL this is done through a vignette, which can be anything from a single paragraph to a twenty-page case study. In PBL the purpose of the vignette is to direct a group of students to a problematic situation or phenomena. The group then defines what aspect of the problem they find most interesting to work with. In other words, they become *problem owners*. The result of the group work is documented and presented in an appropriate way. In TM the first phase is a lecture that ends with a challenge for the students. It should be emphasized that the lecture not necessarily is a lecture in the traditional sense. For instance, it could be a video or a panel debate. This is described more in detail in section 3.1 below.

### **2.4 Asynchronous Learning Networks**

This section describes asynchronous learning networks (ALN) and discusses implementations and related research. The paper presumes that the reader is fairly familiar with the concept of asynchronous learning networks. However, a brief recapitulation of the core concepts is made below.

Implementations of ALN utilize different tools for computer mediated communication (CMC). In this way, ALN can be understood as an IT infrastructure supporting educational activity. This infrastructure includes email, bulletin boards and news groups, synchronous chat systems, computer conference systems, group decision systems, and most recently pages on the World Wide Web (WWW) (Hiltz and Wellman 1997). The central pedagogical idea in an ALN is collaborative learning at the time and place of the individual learner's

convenience (Bourne, McMaster et al. 1997). ALN is a special software structure purposely designed to support collaborative learning (Hiltz and Wellman 1997). An ALN is in other words a teaching and learning environment located within a CMC. ALN's are best at enhancing educational activities when they serve as a way to create a feeling of a group of people learning together and to structure and support carefully planned collaborative learning activities (Hiltz and Wellman 1997). Research about ALN's has been conducted for more than a decade. Well known is the work done at New Jersey Institute of Technology with the Virtual Classroom as a trademark. Scandinavian research on ALN's is to some extent following this tradition. However, it is suggested that Scandinavian use of ALN is slightly more towards facilitating interaction among the students, that is, horizontal interaction. Whereas, research outside Scandinavia have a tendency to use and study ALN as a tool to deliver instruction.

There are also problems and disadvantages in using ALN's. Anonymity and issues related to the fact that people do not meet face-to-face introduce initial problems with many ALN based courses and other activities. Many students find it easy to postpone attendance when they are busy with other things. This can easily turn into falling seriously behind. It is also shown that despite good intentions when structuring a computer conference there is an extensive risk of information overload. Early and enthusiastic course activity in the beginning of an ALN course might result in some students overloading others by writing and posting voluminous and numerous messages.

In this research, *forum* is interchangeably used together with ALN, and in some cases conference system. The term forum was exclusively used when talking with the students. This is also what students used in communication with each other.

### **3 Applying TM in ALN**

This section is divided into two parts. The first part describes the design of an introductory course in Informatics according to the philosophical ideas outlined above. The second part describes how the course later was evaluated.

### 3.1 Designing the course

*“Introduction to Informatics”* as a five credit points course was offered to forty-three guest students from China, completing their final year of an international MBA program at a Business School at a Swedish University.

The Informatics course was scheduled to last over ten weeks and include both theoretical aspects of Informatics as well as some hands-on exercise. In other words it is not a computer literacy course. In the previous year, a similar course had been offered to the students. However, at that time, the aim was to introduce the students to more traditional aspects of computer use in organizations, i.e., computer literacy. This created some expectations among the students. This is however understandable as there are emerging definitions of what constitutes computer literacy, information literacy and information technology literacy (see for instance Mueller (1997) for a discussion). To meet the demand from the students we asked them to take part in four workshop sessions, each two hours long, with an emphasis on practical work with the computers and related software applications.

Fifteen teachers were approached and asked if they could be responsible for one of the modules. Eight of them agreed to participate and were engaged in the course, one for each module. Some of the educators were given the topic for the module, others were asked to suggest their own. The reason was that some of them do research in a variety of fields, and some research was more difficult to pinpoint. They were offered standard payment for their efforts that would include two hours of lecture, and a total of three hours (at the time of their convenience) of electronic discussion in the ALN.

The eight teachers received the same instructions through a personal briefing. They could fairly freely lecture about aspects or portions of their own field of expertise. However, the purpose of the lecture should **not** be a summary of state of the art research within the specific field. The reason for emphasizing this instead of recommending what the teacher should do was the idea that the individual teacher should choose her own style for the lecture. The intention was not to have all the teachers do a lecture that was uniform in format. Neither should the lecture be a summary of the theories or models dominating the specific research field. The purpose of the lecture was to make the students interested in the teacher’s field of research. Learning is most effective when students are truly engaged. The lecture should

challenge the students and initiate acts of knowledge discovery. If possible, they should also try to relate the module to China in some way. Many of the teachers managed to do this in the form of cases and anecdotes. The author emphasized to the eight educators that:

*“After your lecture and from the students own interest, fifty, if not seventy, per cent of the class should go straight to the library, or to a computer connected to the Internet to search for more information about what you just talked about.”*

The modules came to be strongly related to the eight teachers’ fields of research, and were the following:

Topic or field	Short description of topic in each module	Discussion initiation
CSCW	Computer Supported Cooperative Work.	Two questions.
Workflow	Workflow and related technology for coordinating and structuring work.	Summary of the lecture and two questions.
The Internet	Electronic commerce. Cases of different organizations and how they have employed the Internet.	Posted two questions in the forum.
DSS	Decision Support System and different aspects of decision making in organizations.	Case with follow up questions.
IT in Health Care	Tele-radiology, computer based x-ray was presented. Ethical issues about computer use.	Questions.
Informatics	A philosophical lecture about changes and the information society we are entering.	One question.
IS Management	Information Systems and Information Resource Management (IRM).	Examples followed by two questions.
IT Management	It is not only use of the technology but a complex management situation.	One question.

Table 4: The topic of the eight modules and what each lecture used to initiate the week to come.

No textbook was selected for the course, instead the week before their module, each educator was to provide one or two *good* articles to be distributed to the students. The students were asked to read and discuss the articles (electronically or traditionally) prior to the lecture. The module started with a two hour lecture on Monday morning, the first day of each module. The educators were instructed to end the lecture with something that would initialize the computer-mediated discussion as discussed above. Depending on the personality of the educator and their teaching style, they were requested to end the lecture with questions that students could discuss or answer online. They could also use longer cases that were presented online, and ask the students to work with a specific aspect of the case, individually or in a group. For the more radical educator, provocation was suggested as an alternative. As the students came from a culturally very different part of the world this was considered a difficult task to perform with predictable and successful outcomes. The teachers were then obligated [and paid] to participate in and facilitate the electronic discussion.

Sending email to the teachers was discouraged. Instead, the students were encouraged to use the ALN for open interaction with the educators and really use them as a resource of expertise for the whole group. Thereby, the students became partners in deciding what to cover in the module. By Sunday afternoon the module ended. The students were then required to summarize the discussion that had taken place during the module in about half a page. When this was completed the module was over and the next module could start the following day. The structure of a module is summarized in the box below.

1. The module starts with a two hour lecture in the format of choice of the educator.
2. The lecture ends by initialization of the ALN part of the module.
3. The educator participates in and moderates the electronic discussion.
4. By Sunday afternoon, the students were required to post a summary of their understanding, or experience, of the discussion during the past week, i.e., module.

Box 1: Basic structure of a thematic module.

The author met with the students for an introduction lecture the first day of the course. The purpose of the course as well as the modules and the ALN was demonstrated and explained. The lecture was followed by a two hour workshop where the students were introduced to the conference system used in the course. The main CMC tool used in the course was a WWW-based commercial conference system and e-mail was used in some situations. Only the very basic functionality of the conference system was used. Figure 1 is a screen of the conference system's interface.

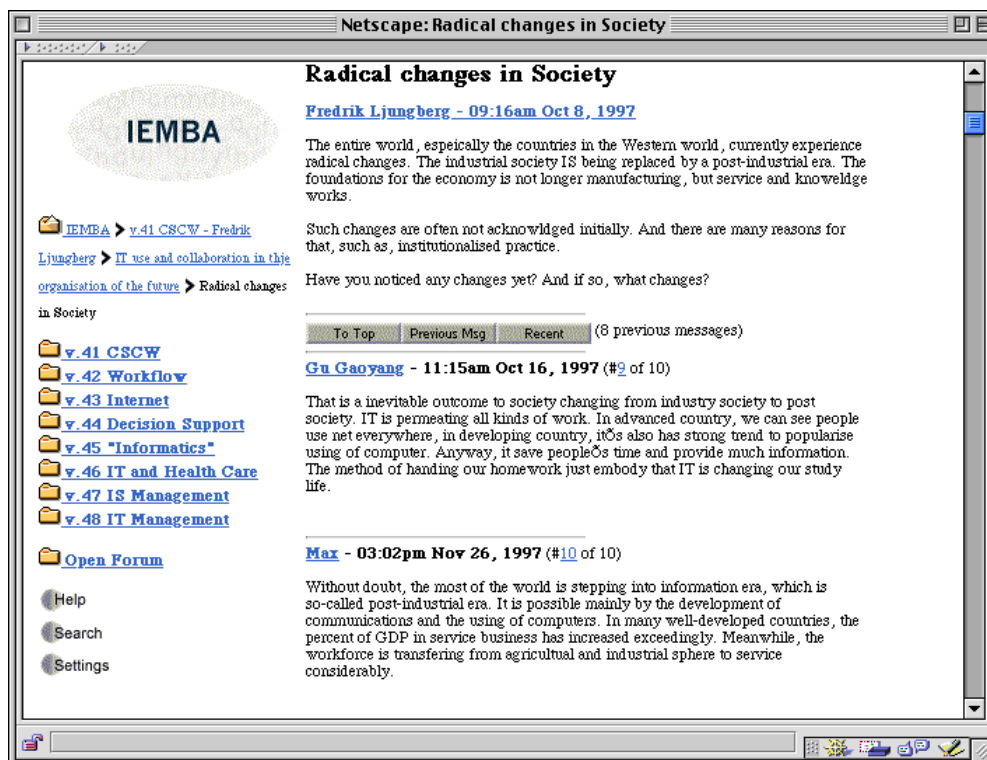


Figure 1: A screen from the conference system used. The upper left side shows the top level where each module has it own discussion. The bottom left side of the screen shows the links to the open forum where the students freely discuss or socialize. The right side shows an actual discussion where the educator raises some issues related to his module.

### 3.2 Evaluating the course

Two surveys were conducted with the students and semi-structured interviews were conducted with the teachers involved in the course. The motivation for using surveys with the students and interviews with the teachers was partly practical. However, the interviews

provided valuable comments and opinions from the teachers that probably not would have been covered in a survey. The results of the final comprehensive exam were also a valuable input for evaluating the course design.

### **3.2.1 The Students**

The forty-three students participating in “*Introduction to Informatics*” were surveyed twice, mid-course and after the last session of the course. The instrument used for the first survey was a single page with a positive and a negative column. Forty-one students completed this. The students were asked to write down at least three positive things and three negative things about the course. The responses were coded by identifying keywords in sentences. Two negative aspects and two positive aspects came out clearly.

The absence of a textbook was the most negative thing about the course at this stage. Apparently, the researcher underestimated the importance of the textbook. The textbook provides a strong structure for how the students approach planning and conducting their studies. Many of the teachers were also subjects for discussions about textbooks.

The separate articles handed out did not provide the structure in advance since they were handed out continuously at eight different occasions. Binding the articles together and adding a foreword, and distributing them at the first lecture can be a solution to overcome this problem.

The second negative aspect was that there was too little time at the computers. A large group of the students had expected the course to be a hands-on course with emphasis on applications such as word processing and spread sheets. The description in the course catalogue clearly emphasized that the course did not cover this.

This was handled by offering them four two hour workshops with exercises and support by tutors. However, when facilitating parts of the workshops, it was obvious that many of the students were fairly advanced users of computers., especially web-searching and communication such as e-mail and chat.

The most positive thing was that the course was different in format. The format explicitly invited interaction with peers and educators. The horizontal interaction, student-student, was new to most of the students. Many students showed in the survey that they had reflected on their own responsibility for the learning process.

The time and place independence was the second positive aspect about the course. Even though very few of the students had a personal computer or access to computers apart from the computer labs they appreciated the possibility to work at the time and place of their choice.

The instrument for the second survey consisted of five sections of questions. Forty students, 24 male and 16 females, with an average age of 29 handed in complete surveys. First the course as a whole; second, their opinions about each of the modules, third, their computer skills, fourth, the strengths and weaknesses of the course, and fifth, some questions of a demographic nature. Most of the questions were multiple choice on a seven point Likert scale. As the size of the population was very limited statistical analysis was not conducted in any larger scale. Table 5 summarizes the results of some of the issues raised in the second survey.

Question	Mean	Std
This course has been ... (1) very ordinary – (7) very unique	5.0	1.5
This course has been ... (1) not fun at all – (7) A great deal of fun	4.7	1.3
Compared to other courses, I spent .. (1) less time – (7) more time	4.3	1.3
I believe this course helped to increase my understanding of IT ... (1) not at all – (7) very much	5.9	1.3
Did this course meet your expectations (1) not at all – (7) totally	4.5	1.3
I used our WWW based forum (1) never – (7) every day	4.5	1.0
I believe the forum contributed to the course as a whole ... (1) not at all – (7) very much	5.5	1.0
Did you read other students contributions in the forum (1) never – (7) every day	4.3	1.2
Did you learn anything from reading the other contributions (1) absolutely – (7) absolutely not	4.2	1.3
I believe my computer skills to be that of a(n) (1) beginner – (7) expert	3.8	1.0
I believe the hands-on exercises increased my skills (1) not at all – (7) very much	4.5	1.1

Table 5: Summary of descriptive statistics.

Despite limited data, the correlation between some variables was tested. Strong correlation ( $r = 0.62$ ) was found between: “This course has been ... (1) not fun at all – (7) a great deal of fun” and “This course has helped to increase my understanding of IT ... (1) not at all – (7) very much.” This can be interpreted as an evidence that engagement and the “fun factor” is important for learning. Correlation ( $r = 0.35$ ) was also found between: “I consider my computer skills to be that of ... (1) a beginner – (7) an expert” and “I used our WWW based forum ... (1) never – (7) everyday.” It is suggested that this indicates the importance of sufficient initial training with the ALN to ensure interaction among the students. Of course, the facilitation of the educator is equally important.

The final exam is also an indicator of the outcome of the introductory course. The exam consisted of eight open-ended questions related to the eight modules. The grades were completely based on the exam; 19% of the students received high pass and 81% pass in a three grade scale. In other words, no student failed the final comprehensive exam.

Personal conversation with the students, both face to face and via e-mail, did reveal interesting aspects. The most striking issue was a small group of students coming up to me after handing in their final exam the last day of the course. After some phrases of greetings, one of them asked: “Why did you give us this exam? We think it interferes with the ideas you have about the modules.”

Summing up the student response it is suggested that the students found the course satisfactory. Most of them posted the required report at the end of the module. Some horizontal conversation among the students took place. Many students viewed the lectures as lectures with a “covering” overview, not as points of departure for further learning. The ALN used provided the necessary infrastructure for the idea of thematic modules. This was the first encounter with student-centered education for most of them. Therefore, the result from the evaluation must be considered very tentative.

### **3.2.2 The Teachers**

The teachers were approached in an informal semi-structured interview some time after the course had finished. The interviews started by asking them to recapitulate the instructions they had received prior to their module. Their responses to this served as structure for the

remainder of the interview. The interviews lasted between twenty minutes and one hour. Notes were taken during the interviews and later analyzed by identifying frequent keywords. The frequency of the keywords then guided the structure of the remainder of this section in that aspects (keywords) raised by more teachers are listed first.

Only one of the teachers asked me to refresh his memory about the instructions for his module and one teacher was somewhat critical of the instructions that he had received. He did not know what he was expected to do. However, the instructions appeared to be clear for most of the teachers, both the lecture and the expected on-line activity. Below is a list of aspects raised by the teachers during the interviews.

First, the heterogeneous group was raised by almost all of them. “I didn’t know how much they knew about the topic, or other related concepts.” This is, however, one of the generic pedagogical problems in all educational activity. With limited knowledge about the group, there is really not any platform for more provocative questions. “I do not intend to insult them” as one teacher put it. Related to the background of the students and the terminology, some of the teachers found using English during lectures to be a problem as this was not their first language.

Second, “I am in the middle of a very hectic period at the moment” was a type of phrase most of the teachers used to describe their workload. Months ago, when they were engaged to participate and to be responsible for a module, the planned time schedule with two hours of lecture and three hours in the ALN seemed not to be a problem. However, when the module started, most of them found it difficult to allocate the time for the ALN based discussion. As one teacher put it: “We’re all optimistic when it comes to time.”

Third, the available time. Two hours for a lecture were perceived as a short time to give background according to the teachers, “but on the other hand, who has time for longer sessions?” However, it seems as if many of them tried to give an overview of their field rather than to focus on introducing and creating an interest for the field. It seems as if it is difficult to challenge and create an interest in a two hour session.

Fourth, the problem of responsibility. One teacher put it very blunt. “I do not care about temporary students but if I have my own course it is different.” He continued to be critical. “The attitude is a big problem. Most teachers try to do as little as possible. The incentive

system is non-existing. Nobody cares what I am doing. Many of my colleagues have the same opinion, they do it and then they do not care about it any more. Teaching is just a way to finance research.” Other teachers are critical to the quality and standard of many courses, but at the same time, they will not talk to others about change. “It is not my responsibility.” One teacher is changing his way of teaching, but he will not tell others to change.

Fifth, being active. Initially many of them stated that they had been active during the module. A quick glance in the log-file of the conference system showed that only very few messages were posted by teachers. When facing the teachers with this fact, they quickly admitted that they had logged in as “guests” to make sure that students were “on the right track.” One teacher used e-mail to push individual students to raise issues for further discussion in the ALN.

Summing up the teachers’ responses, it is clear that they understood the ideas and, at least to some extent, found them viable for their purpose, but there is not an institution around it to make it work. The role of the course facilitator was questioned, the suggestion was that professors should have lectures, and facilitators, such as teaching assistants, should participate in the discussion part. Pedagogical trends come and go according to a senior professor and he concluded: “There are some generic standard building blocks of communication and educational activities we are elaborating with in different orders and sequence. But, what we are doing is almost always the same.”

#### **4 Discussion**

This paper has discussed a philosophy for designing introductory courses. The philosophy was evaluated by designing and realizing an introductory course in Informatics. In this section the philosophy and the results from the evaluation serve as the starting point for proposing a framework for structuring introductory courses. Let us first return to the assumptions made in the introduction and discuss them in the light of the design and evaluation of “*Introduction to Informatics.*”

- Thematic modules (TM) are a fruitful structuring philosophy for an introductory course. *Analyzing the collected data and reflecting on the experience from the course it is claimed that this is a valid assumption.*

- Asynchronous learning networks (ALN) are viable resources to enhance TM.  
*The results suggest this to be a feasible combination.*
- TM and ALN are a suitable approach for constructivistic and collaborative learning.  
*This needs to be further investigated.*

#### **4.1 Proposing a framework for TM in an ALN**

Lessons learned from the design and implementation an introductory course with the philosophy of TM in ALN serve as a starting point for proposing a framework for designing and coordinating introductory courses. At this stage, the framework consists of seven guidelines which all to be elaborated further.

- First, the role of the course facilitator is very central. The facilitator must be an active participant in the different activities. Both collaborative learning and ALN require taking initiative and being active, but it is still the responsibility of the educator, e.g., facilitator, to create the choices open to them.
- Second, teachers involved must receive a thorough introduction to the purpose of the module. It is very easy to fall back on a traditional lecture structure where the lecture is a closed unit with a start and an end. The lecture in a thematic module on the other hand does not include an end, it is only a starting point.
- Third, the importance of varying starting points for the ALN portion must be emphasized. There is a slight risk that all modules in a course will have the same format. This might introduce an undesired routine behavior among the students.
- Fourth, teachers should not automatically be responsible for the ALN based discussion. Most introductory courses are fairly large and moderating a discussion with say eighty students is not really possible. Instead, teaching assistants (TA) should be engaged as facilitators in smaller groups. The TA is responsible for facilitating the discussion but does not assess the students participating in the discussion.
- Fifth, the size of the groups. From the above, it is obvious that a group of forty students is not feasible. In PBL a group of eight is usually recommended. However, this is a question about resources. It is possible to facilitate high quality discussions with up to twenty students, but this is of course depending on several factors, mainly of economic nature.

- Sixth, the assessment system must be an integrated part of the whole course. Active participation is a main goal in a course structured as TM, which should be rewarded by the incentive system, e.g., credit. Therefore, a final comprehensive exam should only be a limited input for assigning the final grade. But, the TM based course is probably better without the comprehensive exam.
- Seventh, the data stored in the log generated by the conference system as well as other applications in the ALN should be used to monitor the activity taking place in the ALN. Visualization of this data can provide the teaching assistant, the teacher and the course coordinator with valuable information for supporting the activity that is going on.

## **5 Conclusions and Further Research**

This paper has discussed teaching, learning and technology and with that as a background, proposed a structuring philosophy for introductory courses: Thematic Modules in Asynchronous Learning Networks. The philosophy was implemented in an introductory course in Informatics and evaluated. The result of the evaluation then served as a starting point for a proposed framework for structuring introductory courses. The conclusion is that the philosophy has potential for introductory, but further evaluation of mainly learning outcomes is needed.

The main limitations of this study are the characteristics of the group, that is, guest students from China, and the limited data collected. The language used in the course was English, which is neither the students nor the lecturers' first language. Therefore, generalization of the results to other pedagogical settings should be seen as limited. However, the results from this study provided direction for further research.

Informed by the findings in this research, we are currently designing the second version of an *Introductory course in Informatics*. The course is offered to second year undergraduate business administration majors. One hundred students are expected to participate, five teaching assistants will facilitate them, and nine lecturers will initiate one module each. Whereas the students in the research reported in this paper were Chinese guest students, the group for the second course will be regular students. Regular in the sense that they are part of a full BA program and the language used in the course will be Swedish, that is the first language of both students and lecturers. The author is currently preparing the lecturers

involved through individual meetings were both content and form of the module is discussed. Each lecturer will start their module with the slide *'What is Informatics'* which is given to them. How each lecturer will initiate the ALN part of the module is also thoroughly discussed with each lecturer. The lecturers are faculty at the Informatics department, except for two who are IT professionals from the industry. The teaching assistants are also prepared for their role in the course. They will participate in a seminar with the author to discuss issues related to their facilitating role, but mainly to learn about the different possibilities with the ALN, such as voting and group editing. Literature of Ramsden (1992) and Harasim et.al (1995) support the preparation of the TA.

The course coordinator (author) met with the students who will participate in the course to make sure all students had access to networked computers. More than 75% of the group of about 100 students had computers with modems at home. This is certainly looking promising. The first 'introductory' lecture of the course will be given five times. That is, each of the five groups of twenty students and one teaching assistant will meet individually with the course coordinator. After the meeting the TA will gather the group for an informal meeting to discuss the modules to come, but also how the TA will facilitate the group using the ALN. The following ten lectures will only be given once with all one hundred students at the same time.

The results of the implementation of the second introductory course in Informatics following the philosophy of TM in ALN will be reported at a later date.

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