

The Gender-perspective in the Swedish Systems Science Education– An Explorative Study of Syllabuses

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Abstract. The aim of this article is to investigate to what extent the gender-perspective is included in Swedish Bachelor study programs in Systems Science. A study of four study programs with adhering syllabuses is conducted and the syllabuses identified are analyzed with a set of keywords as indicators of the gender-perspective as well as a more interpretative analysis in search for indication of the incorporation of the gender-perspective. The result of the study conducted is that gender is not present to any larger extent in the syllabuses and that it is likely that the gender-perspective has not had any bigger influence on Informatics. It is claimed in this article that if the gender-perspective will have any impact it must make its way in to the syllabuses and be reiterated in both study program syllabuses and course syllabuses.

Keywords. Gender-perspective, Informatics, Syllabus, Education

Introduction

Digital artifacts play a crucial role in contemporary society; hence training tomorrow's professionals in the art of developing and adapting these artifacts to fit different settings is an important task. One discipline that has engaged in this task is Informatics, addressing the interplay between or maybe the intertwinement of information technology (IT) and humans (e.g. Dahlbom, 1996). One indication of this engagement is that Informatics for example is offering students the Systems Science study program in which the students can acquire skills, abilities, and knowledge in programming, databases design, systems development methods, organizational impact of IT, etc. The goal of this study program is to offer the students these, what can be labeled, mental tools so they will become successful in their future line of profession, perhaps as developers of digital artifacts. A mental tool that lately has gained a lot of attention and leverage in the Swedish higher education in general is, what in this article is called, the gender-perspective – discussed more thoroughly further on. The gender-

perspective or rather gender has been something that the Swedish government in a succession of years has imposed the Swedish universities and university colleges to first map and later increase the impact of in courses and study programs (Letter of regulation for universities and university colleges for the fiscal year of 2005; 2006; 2007). Maybe as a consequence of these political decisions, the number of courses categorized as gender science – interpreted in this article as addressing the gender-perspective in different ways - in the database at Studera.nu¹(www.studera.nu) has almost quadrupled between the semester of fall in 2007 (24) and the same semester in 2008 (94).

The gender-perspective is also something that has not passed the technological oriented disciplines in general and Informatics in particular by unnoticed. There have been claims that the gender-perspective has a potential to add new dimensions to the technology oriented disciplines. For example Trojer (2002) claims that the gender-perspective – she calls it gender research – has the potential to widen the knowledge-frames of as well as practice of technology development, indicate different directions for the application of technology science, take part in new solutions etc. These claims are echoes of for example Wajcman (1991) or Faulkner (2001) where they argue that the gender-perspective could be an aid for identifying different forms of uses, needs and wants related to technology. Another claim that can be made is that the gender-perspective can be useful for understanding the social outcomes of IT and the processes of inclusion and exclusion in social settings that are, as Castells (2004) puts it, empowered by digital artifacts (see for example Faulkner and Lie, 2008). The gender-perspective can also be claimed to elucidate the over-representation of men in both IT related education as well as in the IT sector as such in Sweden and many other countries. According to Wajcman (ibid) or Mellström (2003, 2004) there is a strong relation between technology and masculinity. With this strong relation as a base men are ascribed an alleged knowingness and confidence with technological artifacts which makes it more difficult for women to approach technology than for men (Cockburn, 1985). Technologies role in the creation and maintaining of masculinity, has given men a more favorable and powerful position when it comes to the development and use of technology (ibid). Turning to more Informatics specific claims concerning the gender-perspective Bratteteig and Verne (1997) presented an article with the title *Feminist, or merely critical? In search of Gender Perspectives in Informatics?* in which they high-light the gender-perspectives potential to criticize the epistemology and create alternatives.

With the current trend in the Swedish higher education toward a bigger interest in the gender-perspective as a point of departure, the aim of this article is to investigate to what extent Informatics as discipline, focusing on Informatics in Sweden, has adopted the gender-perspective and incorporated it in the Systems Science study programs. The reason for choosing to focus on Informatics in Sweden is first of all because of the increased interest mentioned above but also because Informatics in Sweden has a little bit different background than Informatics in Denmark or Norway for example. According to Bansler (1990), Informatics in Sweden is coupled not only to technology science but also to social science while Informatics in Denmark and Norway traditionally is coupled solemnly to Technology

¹ Studera.nu is a portal, managed by *The Swedish national agency for higher education* and *The national agency for services to universities and university colleges*, where students can get information about course, study program and higher education in generals as well as apply to courses and study programs at Swedish university and university colleges. The website should contain all courses available.

science or Nature science. Hence, it can be argued that the gender-perspective could have become easier adopted in Informatics in Sweden than in Denmark or Norway.

The research as such is conducted as a study of the syllabuses for the Bachelor study programs in Systems Science including both syllabuses for the study program as well as syllabuses for the different courses in Informatics included in the study program. The methodological approach draws on Adam, Howcroft and Richardson (2004) where a set of keywords is used as indicators of the gender-perspective and the context the keywords occur in are further analyzed. There is also a more interpretative approach to it where the content of the syllabuses are analyzed in search for anything that can be interpreted as concerning the gender-perspective and that is not indicated by any of the keywords. Focusing on syllabuses and excluding literature, lecturer and their lecture notes is of course a weakness. On the other hand, if the gender-perspective is mentioned in some way in the syllabuses, I argue that the discipline or at least that particular unit running the study program have adopted and domesticated the gender-perspective and made it an integrated part of the discipline. The syllabuses are the official documents that govern and regulate the educational activities at Swedish university and university colleges (Gustafsson, Fransson, Morberg and Nordqvist, 2006). The syllabuses describes things like the main purpose, the content, the structure etc. (Högskoleförordning, chapter 6 §7). The syllabuses can be thought of as a contract between the educator and the students and it is towards the purpose, content, structure, etc. formulated in the different syllabuses the education should be targeted at (ibid).

Background

As mentioned above the gender-perspective has not passed the technological disciplines by unnoticed and the gender-perspective has been used in attempts to understand the imbalance and create a balance in IT educations on different levels. The point of departure for many of these attempts is questions similar to the one posed by Björkman (2005) “*Why are there so few women in Computer science and what can be done to increase numbers?*” Attempts that have been made are to make IT in general more interesting to girls by equipping them with proper and for them relevant knowledge to make choices concerning IT as a potential career (Barker, Snow, Garvin-Doxas and Weston, 2006; Kekelis, Wepsic Ancheta, and Heber, 2005), introducing girls to technology and IT projects (Denner, Werner, Bean, and Campe, 2005), or making teachers engage and support girls in their attempt to approach IT (Goode, Estrelle and Margolis, 2006). Others have focused on how students enrolled in IT courses or study programs perceive the imbalance between men and women (Miliszewska, Barker, Henderson and Sztendur, 2006), if and how this imbalance differs between different countries (Charles and Bradely, 2006) and different strategies for making IT related subjects attractive for women (Lagesen, 2007). The imbalance has been explained by for example Sefyrin (2004) who argues that education in IT is characterized by a male dominance and female subordination. This is however to some extent challenged by the findings of Miliszewska, et al. (ibid) which states that female students in Computer Science do not perceive the educational environment as gender biased. Sing, Allen, Schekler and Darlington (2007) claim that women have lower confidence and rate their abilities lower, despite objective evidence of the contrary, which is a potential risk for not continue the education. This is challenged in for example Plumm (2008) in which it is stated that being enrolled in to an IT education reduces

computer anxiety and potentially increases the interest of technology oriented fields. Another way of understanding the imbalance is to study how women are addressed in advertising campaigns related to IT educations (e.g. Lagesen, 2003). It is also claimed by for example Tsagala and Kordaki (2007) that men and women are influenced by different things upon choosing an IT career. This is supported by Miliszeska et al (ibid) when they claim that the support from the family is more often mentioned as a factor by the male students than by the female students. However there are also some attempts to identify gender-perspective issues in courses and in the actual content of the education in IT like syllabuses, literature, examples, exercises, assignments, etc. However, these studies are inconclusive, and claims the IT education to be both gender neutral (Miliszeska et al, ibid) and gender biased (Plumm, ibid). Miliszeska et al (ibid) found that students in Computer Science do not perceive their education as gender biased, besides the imbalance between men and women in the courses. Plumm (ibid) on the other hand reports that there are studies of how books in Computer Science provide a gender stereotypical picture of men and women.

As can be seen, the IT education has been addressed from a gender-perspective. However, the gender-perspective has so far mostly been used as a lens that the IT education has been studied through. Much less has been done concerning in what ways the gender-perspective actually is something that not only is considered in the education but actually a mental tool that the students should be equipped with. It might of course be argued that what are taught in IT educations are different aspects of IT and that does not concern gender. However in contemporary society where IT plays a significant role in virtualizing human relations it is not unlikely that IT affects gender in different ways. Hence it is important for the future professionals in developing and adapting digital artifacts to be trained to know about the impact technology might have, not only on the business level but on the social level as well – where gender is one aspect to consider.

What is the gender-perspective about?

As was argued above, the gender-perspective is important and can contribute with new perspectives and insights. It is also the case that the gender-perspective has been used for understanding and criticizing IT educations in general. But so far I have only stated that the gender-perspective is important but not what it is all about. Some clues can be found in the discussions above but they need to be further developed so a deeper understanding of the gender-perspective is achieved. Unfortunately there is no one single definition of the gender-perspective or rather gender as phenomenon. Gender is a complex phenomenon and I will in this article discuss gender in terms of a social practice and structure. The switch to using gender instead of gender-perspective in this section is because I regard the gender-perspective as more of an activity in which gender as phenomenon is applied than a concept in itself in need of explanation.

A definition of gender that mirrors both the structural as well as the practical aspects of gender is: Gender is about historically and socially constructed relations between men and women (Gemzöe, 2004). This definition can be challenged drawing on for example Connell (2002) who claims that gender also concerns relations between men and between women (Connell, ibid). Connell also claims that relations are an important way to understand gender and she distinguish four types of relations: Power, Production, Symbols and Emotions. I will

not penetrate these relation types any deeper it is enough to know that gender has to do with different types of historically- or socially constructed human relations.

Starting with the social aspects of gender it is argued by for example Butler (2004), Connell (ibid), Elvin-Nowak and Thomsson (ibid) and Fenstermaker, West and Zimmerman (2002) among others that gender should not be regarded as a fixed state but rather as something that all individuals construct on a daily basis in social interaction with others. According to Kvande (2003), gender should be defined and understood through concepts such as variation, complexity, change, and stability and West and Zimmerman (ibid) add that gender is a process of constructing and reconstructing differences.

Turning to the historically aspects of gender, I interpret them to be about institutionalized structures that are the results of the constructing and reconstructing processes that have taken place over time. According to Thurén (1996) these historical aspects can be called a gender regime and is a historically constructed pattern of relations between men and women, as well as how these patterns should be understood in different situations. Connell (ibid) argues that a gender regime is a more local phenomena occurring in an organization or a family. On a more global level - or at least societal level – the same patterns are called gender order and a gender regime can both be aligned to the gender order and contradict it. These are however not the only names for the more structural aspects of gender. Other names are for example gender system, gender order system, or patriarchy (Hirdman, 1988; 2002; Wahl, Holgersson, Höök, and Linghaug, 2001). Hirdman (ibid) argues that the structural aspects of gender can be discussed in terms of two different logics. The first logic is that men and women are being separated concerning work, characteristics etc. A dichotomy is created and maintained at all times. The second logic is that men are considered to be the norm, men are regarded to be superior and men are ascribed a higher value than women. A hierarchy is created and maintained at all times.

Relating the discussion on gender to the gender-perspective, I argue, that it is about applying the knowledge of gender being about relations between men and women and having practical as well as structural properties. Because of the impact IT has had on the social settings of humans it is important for IT professionals to at least reflect upon the potential impact IT can have on social settings in general and on gender in particular. For IT professionals to be able to do this they simply need to be equipped with a mental tool that can be used for this purpose. I claim that the gender-perspective is such a mental tool.

Method

In this section I address the construction of set of keywords that mirrors the gender-perspective, the process of identifying potential study programs to be included and the analysis of the identified syllabuses. The method used for this research draws, as was mentioned in the Introduction, on Adam et al (2004) in which they firstly use a set of keywords as a filter to identify articles with a gender-perspective published in a selection of journals in the field of Information Systems. Secondly they analyze how the gender-perspective is approached in the articles identified. My use of the method is similar but instead of selecting a set of journals to study, I select a set of study programs to study (The selection of study programs is described below). But I am not using the keywords as a filter for deciding what syllabuses to read and what not to read and then conduct a more thorough

analysis. Instead I am analyzing all of the selected syllabuses and use the keywords as indications of the gender-perspective and the thorough analysis focusing on the context the keywords are found in. The thorough analysis is also used to identify if there are other attempts to address the gender-perspective that is not indicated by my set of keywords.

Constructing a set of keywords mirroring the gender-perspective

The construction of a set of keywords for this study draws on the keywords used by Adam et al but is also supplemented by keywords found in the discussion concerning gender above. Because the material I am going to apply the set of keywords on is in Swedish I have to translate the keywords used by Adam et al to their Swedish counterparts. It might be difficult to transfer and translate concepts between settings and languages. However, I have tried to translate the concepts in to Swedish concepts that are meaningful for discussion concerning gender hence the gender-perspective.

Constructing a set of keywords that are mirroring the complexity of a phenomenon like gender is difficult. Which keywords should be included and which should be excluded. This weakness I am addressing by also including a more interpretative analysis of the syllabuses.

Identifying study programs and syllabuses to be included in the study

The selection of syllabuses included in this study is made by using the database accessed through the portal Studera.nu. At Studera.nu there is a function with both a Swedish and an English interface that enables students to search for courses and programs. For this study the Swedish interface is used. The interface is rather simple and what you do is that you make choices concerning when -, what -, where - and how to study, by marking alternatives in drop down menus or scroll lists, or by checking boxes.

To start with the question of what to study, a couple of interesting subjects for this study are provided at Studera.nu. Because the focus of this study is to investigate Informatics as discipline all subjects containing Informatics are interesting. Two such subjects can be identified: "Informatics" and "Informatics and systems science". Also the old name for Informatics, "Administrative Data Processing" can be found as a subject at Studera.nu. An additional two subjects are included because they either address an issue important for Informatics as discipline "Information systems design" or are the name of the study program to be studied "Systems science". Beside these five subjects other subjects can potentially be of interest for this study such as "Information technology" but because both Informatics and IS are possible choices, this subject and others are left out of this study. Besides deciding what to study this step also includes to answer the question when to study. For this study, only the semester in the fall of 2007 is included. This choice is made because when the empirical work for this article took place, this was the most resent semester. I claim that it is more likely that the gender-perspective is present in more resent syllabuses than later one. Especially after the Bologna agreement and the revision of the study programs and courses with syllabuses that took place.

Next, one has to answer the question where to study. The possible choices are one particular or all university or/and university college giving courses or study programs within the desired subject. Because I want to get as many hits as possible I choose the all-alternative.

Finally, the how question must be addressed including on what level one want to study – on courses or study programs, on preparatory, basic or advanced level. It is also possible to narrow down the search by indicating rate of study (part-time, full-time or both) or if distance studies is what is preferred. Because focus was on the Systems Science study program with a Bachelor degree the choices I made are study programs on a basic level. I did not make any choice concerning the rate of the studies because that is not relevant.

The next step is to sort the study programs in Systems Science out from other study programs that matched the criteria above. To sort the desired study programs out three criteria are used. Firstly the study program should have the words “Systems” and “Science” in any form in the program name. The name criterion will distinguish the Systems Science study programs from other study programs. Secondly the study program should comprise of 180 cr because this is how many credits it takes to get a Bachelor degree in for example Systems Science. Thirdly, the study program should have Informatics as major. The Informatics as major criterion is chosen because there are study programs in Systems Science where the major is for example Computer Science. The focus of this article is Informatics and not Computer Science.

The last step of the syllabus identifying process is to get hold of the syllabuses as such. Because of the explorative nature of this study and that the data gathering is conducted on the Internet, no effort is put on gathering syllabuses that was not accessible on-line. If the study program met all the other criteria but do not have the syllabuses on-line it is excluded.

Analysing the syllabuses identified

Turning to the analysis phase of this process it is conducted in the following way. I first simply search for the keywords indicating the gender-perspective in the course- and program syllabuses. Because the analysis is conducted on Swedish material the Swedish keywords are used. When a keyword is identified the context it occurs in is further analyzed. In parallel with the scanning of the syllabuses for the keywords an analysis of other formulations in the texts that could indicate the presents of the gender-perspective are also conducted.

Summary of the different steps of the method

A summary of the different steps in the research process is as follows:

1. Identifying a set of keywords that mirrors the content of the gender-perspective
2. Identifying potential study programs to study by addressing the questions:
 - a. What to study
 - b. When to study
 - c. Where to study
 - d. How to study
3. Sorting out the study programs in Systems Science by applying following criteria:
 - a. Systems science in any form in the name of the study program
 - b. Study program comprising of 180 cr or more
 - c. Having Informatics as major
 - d. Having the syllabuses on-line
4. Analysis of syllabuses related to the Systems Science study programs
 - a. Applying keywords on syllabuses

- b. Analyzing context keywords occur in
- c. Analyzing other formulations that can indicate the presents of the gender-perspective

Identifying keywords that mirrors the gender-perspective

On constructing a set of keywords I draw on the discussion concerning gender above as well as the set of keywords used by Adam et al (2004). Starting with the keywords used by Adam et al they are the following: **Gender, Equal, Equality, Opportunities** and **Feminism**. I am using these keywords and try to translate them into corresponding Swedish words. However, I do not claim that the Swedish translations are mirroring exactly what Adam et al had in mind but they mirror at least some of the discussions concerning gender and the gender-perspective in Sweden. However many of these keywords used by Adam et al are on a rather profound gender-level and might not be on the level Informatics as discipline and the Systems Science study program are on. Hence some more basic keywords for the gender-perspective, except maybe for gender, need to be included. Turning to the discussion concerning gender above I identify three keywords that could be used as indicators of the gender-perspective: **Man/Men, Woman/Women** and **Relations**. I also described gender to be about different types of relations, hence the keywords: **Power, Production, Emotions, and Symbols**. These keywords are not as simple as man for example but describes gender in for me at least understandable way. The logics described by Hirdman (ibid) are also to some extent describing relations, although from a more structural perspective. Hence **Hierarchy** and **Dichotomy** also are keywords included. Because the syllabuses analyzed are written in Swedish I also provide the corresponding Swedish words. The complete set of keywords is summarized in Table I.

English keywords	Swedish keywords
Gender	Genus
Man/Men	Man/Män
Woman/Women	Kvinna/Kvinnor
Relations	Relation
Power	Makt
Production	Produktion/Arbetsfördelning
Emotions	Känsla/Emotion
Symbols	Symbol
Hierarchy	Hierarki
Dichotomy	Dikotomi
Equal	Jämlig/Jämställd
Equality	Jämlikhet/Jämställdhet
Opportunities	Möjlighet
Feminism	Feminism

Table I: Keywords for identifying gender (Both in English and Swedish)

Result of the study

The result of answering the questions of when (Semester of fall 2007), what (Informatics, Informatics and Systems Science, Administrative Data Processing, Information Systems Design, and Systems Science, where (All of the Swedish Universities and University Colleges) and how (Study program on a Basic level) at Studera.nu generated the following number of possible study programs (See Table II)

Subjects in database	Number of study programs in fall of 2007
Informatics	72
Informatics and system science	6
Information systems development	21
Administrative data processing/IT	2
Systems science	17

Table II: Number of identified programs

Looking through the generated set of study programs there are quite a few programs that are not study programs in Systems Science such as programs in Business administration and IT, Digital media production, Public service administrator just to mention a few. Of course these programs are in some way related to System Science and Informatics, but they are still not programs in System Science. The length of the programs also varies between 30 cr to 270 cr. A sorting process is needed to distinguish the Systems Science study programs from the others.

The sorting process is based on two criteria stated earlier: “Systems” and “Science” in some form in the program name and comprising of 180 cr. The result of this sorting process is that 13 study programs are singled out that fitted both criteria. Ten of the study programs have System science in their Swedish name as well as in their English name when this is provided at Studera.nu. In those cases when an English name is not provided I have translated the Swedish name. (See Table III)

Program name	University/University college	Credits
System science program	Dalarna	180
System science BSc/MSc	Borås	180
System science BSc	Luleå	180
System science BSc program – Design of information system	Lund	180
System science program	Örebro	180
Study program in systems sciences with emphasis in design, interaction and innovation	Umeå	180
Computer and system science	Blekinge	180
Computer and systems science BSc program with emphasis on environmental applications	Swedish university of agricultural sciences	180
System science program	Växjö	180
Bachelor program in computer and system sciences	Stockholm	180

Table III: Identified programs corresponding to both search criteria

However in three cases when the English name is provided it do not include Systems Science in any form even though the Swedish name does. These three programs and their by me to English translated Swedish names are as in Table IV.

English program name	Translation of the Swedish program name	University/ University college	Credits
Information systems: IT, users and organizations	System science: IT, users and organizations	Gothenburg	180
Program in computer science with concentration in environmental science	Program in computer and system science with concentration in environmental science	Uppsala	180
Program in computer science with concentration in systems development	Program in computer and system science with concentration in systems development	Uppsala	180

Table IV: Identified programs where the English name does not contain Systems science

The next step is to identify the syllabus for each of the study programs. These syllabuses indicated the content of the study program as well as which courses each program consists of. Here I ran into some problems because syllabuses are not always available on the program's website. Hence the programs in Gothenburg, Swedish university of agricultural sciences, Växjö and Lund are excluded for the time being. Another problem is that not all of the identified programs have Informatics as main subject. Hence the programs at Luleå, Blekinge, Stockholm and Uppsala are excluded. This leaves me with the following five programs that I will take a closer look at:

Program name	University/University college	Credits
System science program	Dalarna	180
System science BSc/MSc	Borås	180
System science program	Örebro	180
Study program in systems sciences with emphasis in design, interaction and innovation	Umeå	180

Table V: Programs included in the study

The above four study programs matched all the criteria but upon starting the analysis of the syllabuses I realized that the study program in Örebro did not explicitly state what courses are included in the study program, which is the case in the other three study programs. In Örebro the students are allowed to choose courses after an initial 30 cr in Informatics. Hence, the following 60 cr are chosen by the author of this article and the choice is based on an attempt to maximize the probability that a course would contain gender. Meaning to, more or less, exclude courses with a more technological focus such as programming and databases and instead choosing courses focusing on systems development. The syllabus for each course is identified, printed out and then analyzed from the concepts earlier presented.

Analysis of identified syllabuses

Applying the set of keywords mirroring the gender-perspective only a few keywords could actually be found in the syllabuses (See Table VI)

Keywords	Borås	Dalarna	Umeå	Örebro
Man/Men		*		
Woman/Women				
Gender			*	
Relations	*	*	*	*
Power	*			
Division of work				
Emotions		*		
Symbols	*			
Hierarchy	*			
Dichotomy				
Equal				
Equality				
Opportunities			*	
Feminism				
Equal				

Table VI: Keywords found in the syllabuses of the Systems Science study programs

Gender in the syllabuses

Maybe the easiest way to indicate that the gender-perspective is something important is to write the word gender somewhere in the syllabuses. In my study gender as concept only occurred once in one syllabus, in the study program syllabus at Umeå. In the last of the stated goals for the program it is stated that the student after completed program should be able to: *Show ability to, based in a gender science perspective, problematize and analyze for the program central theories and concepts.* No where else in the syllabuses for this program and in any of the other programs gender is mentioned.

Relations in the syllabuses

The only keyword that could be found in all of the study programs is relations. The concept of relations is used in several different ways and contexts and not always discussing gender issues. If we start with the discussions that actually could relate to the gender-perspective, they are rather scarce. It is actually only in the syllabuses for the study program at Borås relations are discussed in a way that can be interpreted as possibly addressing gender, even though this may not really be the case. For example in the syllabus for the course Information Behavior in Virtual Environments there are formulations like that after completed course the student is expected to be able to *“Account for relations in virtual communities”*. Later on in the syllabus the content of the course is discussed and it is stated that the course will deal with *“Human relations on a group- and organizational level (network structure)”*. In the syllabus for the course Information Behavior - Social Interaction and Co-design the student is, after completed course, expected to be able to *“Identify different interactions and relations in the*

system (Virtual network my remark)". Possibly also that the student after completed course is expected to be able to "Account for the relation between humans and society". But, this formulation is touching upon another way of using the keyword relations that is really about discussing the relation between different theories, different phenomena etc.

In the course syllabus for Informatics A at Umeå the above referred to use of the keyword relation is evident. It is stated that the aim for the course is to "Give basic knowledge about the relation between the organization and its IT artifacts". Later on it is stated that the aim for the course module Systems development and organizational change is to "Deal with the relation between implementation and redevelopment of information systems", and that the purpose with that module is to "Give an understanding for the relation between organizational change and the use of information technology". However, this is nothing unique for Informatics courses at Umeå. At Borås the students are expected to be able to "Discuss the activity theory in relation to IT-mediated interaction between humans" (Information Behaviour - Social Interaction and Co-design) and in the course Informatics as Science to discuss "The relation between these theoretical frameworks" (Systems theory, information theory, communication theory etc. my remark).

The third way of using the keyword relation is in a database context. All the study programs except for the one at Borås are writing about "Relational databases" (Databases design, Umeå; Informatics basic course, Örebro; Databases and Information Systems, Dalarna. Related to databases there is also writings concerning "The relational model" (Umeå), "Relations between entities and attributes" (Umeå), "Relational database tables" (Dalarna) and "Relational algebra" (Örebro). None of these has anything to do with gender.

Man, emotions, hierarchies, symbols , power, and opportunities in the syllabuses

Six other keywords are found in only one of the study programs each. The keyword "man" can be found in the syllabus for the course Introduction to Informatics at the study program at Dalarna and it is actually not used in any way that relates to the gender-perspective. Instead it corresponds to the English word one or you, meaning some undefined person. The formulation is ...*basic principles for how one cooperates...*

The discussion concerning emotions in the course Communication and group dynamics in systems development projects at Dalarna is not very comprehensive. It is only stated that the student will develop ability to "Understand and deal with situations of socio-emotional character in a systems development project". This is interpreted as being about how to deal with emotionally charged relations, which could be said to be about the gender-perspective.

The discussion concerning hierarchies in the course syllabus for Information Behavior in Virtual Environments at Borås is also scarce. It is only stated that the student after completed course is expected to be able to "Identify hierarchical structure" (In virtual communities my remark). If this is about human hierarchies or technological hierarchies are hard to say. But, hierarchical structures as concept can be interpreted as potentially concerning the gender-perspective.

Symbols as concept is discussed in two syllabuses at Borås: Information Design and Media Communication. The context is to be able to understand discuss and account for how symbols are used, cultural aspects of symbols, and the relation between meaning and symbols.

In the syllabus for the course Media Communication another of the keywords is found, namely Power. In this syllabus Power is discussed as concept as well as a structure. Here the gender-perspective could be present.

Finally, Opportunities as concept occurs in the course syllabus for Informatics C at Umeå but is related to the opportunities and limitations of methods, techniques and tools for systems design, hence not related to the gender-perspective.

Gender potential in the syllabuses

Besides the occurrence of the keywords interpreted to more or less address the gender-perspective, there are formulations in the syllabuses that can indicate the presents of a gender-perspective without actually explicitly stating it. In the syllabus for the A course, module Introduction to Informatics at Umeå there is for example one formulation that the course will orient the students of the content of Informatics which is among other things about to address the social aspects of the use of information technology. This I interpret as opening up for a discussion concerning in what ways IT can affect gender as social aspect. The same interpretation can be made for the course Introduction to Informatics at Dalarna in which there are discussions of the use of IT in contemporary society from a social perspective. In several syllabuses group dynamics is discussed (Dalarna – Communication and Group dynamics in systems Development Projects and Borås – Informatics as Science). And in the syllabuses of the course Informatics, Analysis and Design with RUP at Örebro the establishing of perspectives upon choosing and using a method is discussed. In the course Media Communication at Borås there is a discussion concerning “agenda setting”, in Informatics C at Umeå there is a discussion concerning “Social norms” in relation to systems design. It is also the case that all these study programs address the systems development process discussing for example the need of change in organizations where gender as perspective should be a natural part.

Discussions and conclusions

The analysis of the syllabuses at the Bachelor programs in Systems Science shows that an explicit gender-perspective is more or less absent. The gender-perspective is only explicitly mentioned in one syllabus for the study programs. The lack of explicit statements for an incorporation of the gender-perspective in the Systems Science study programs can be interpreted in different ways. It can be interpreted as the gender-perspective has not had a big influence on Informatics as discipline, that the gender-perspective has had an influence but the discipline does not regard it to be of importance for the students at the study program to know about, or that the gender-perspective has already been assimilated into the study programs and does not need to be explicitly mentioned. That Informatics as discipline has assimilated the gender-perspective is unlikely. There is too little research reported that has included a gender-perspective and the gender-perspective has had difficulties to gain any leverage in disciplines related to technology in general. That Informatics as discipline has rejected the gender-perspective is more likely but there has been too little discussions concerning this issue and again too little research for this to be likely. Hence, the most likely interpretation is that the gender perspective has not yet had any bigger impact on Informatics as discipline. However, what was also shown in the analysis is that there are formulations,

some supported by the gender-perspective keywords and some not, in the syllabuses that can be interpreted to express a gender-perspective hence indicating a gender-perspective potential in the study programs and for Informatics as discipline. Unfortunately there are several other interpretations that can be made that do not include the gender-perspective. I claim that if the gender-perspective will be an integrated part of the Systems Science study programs it must make its way in to the syllabuses. One good example is Informatics at Umeå which is the only of the universities and university colleges included in this study that explicitly state that the gender-perspective is important and something the students should learn. However, one problem with Umeå is that the keyword, in this case gender, only occurs in the syllabus for the study program and is not mentioned later. This might not be a big problem because it can be the case that if it is stated in the syllabus for the study program it will appear in courses naturally. However, looking at how the other goals in the study program syllabus are formulated many of them can in fact be found in the course syllabuses as well (see Table VII).

Goal-formulations in syllabus for study program	Goal-formulation in syllabus for courses
Apply for the discipline basic theories of methods for investigation and construction	Give an overview for the basic theories concerning methods for investigation and construction in Informatics
Independently as well as in cooperation with others plan, work and administrate a project	Independently plan and conduct an examination work permeated by a scientific approach. Independently conduct a IT project in cooperation with others and author, discuss and defend a written project report
Apply basic skills in programming and database theory to realize and modify a system	Apply basic skills in constructing a program Give an overview of and apply the basics in database theory and practically construct a database process its content.
Understand and explain information technology's basic principles, functions and applications	Account for computer- and information technology's basic principles, functions and applications

Table VII: Goal-formulations found in study program- as well as course syllabuses

I claim that if the gender-perspective will stand a chance to become part of the Systems Science study program it must first find its way in to the course syllabuses much like programming and databases have. It is not enough as in Umeå only have it in the study program syllabus. It must be iterated in the course syllabuses as well to have the desired impact. Only if the gender-perspective is recognized by being included in the syllabuses of the study programs as well as in courses it is certain that the developers of tomorrow's digital artifacts at least might have a gender-perspective.

Further research

It is important to not only focus on the absent of the gender-perspective in syllabuses in Informatics, but also try to find some examples on how the gender-perspective has been incorporated in Informatics courses. It is also important to investigate how to incorporate gender in course syllabuses in Informatics and answer questions like: “Which words should be used when indicating the presents of gender in course syllabuses?” and “Should all courses or modules integrate gender or are some courses/modules more suitable?” Finally, it is also the case that syllabuses only show one side of the story. To get a more comprehensive picture it is necessary to investigate the courses in practice including the course literature, lecture notes, assignments etc.

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