



Getting Involved: Perspectives on the Use of True Projects as Tools for Developing Ethical Thinking in Computer Science Students

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ABSTRACT

This article describes a unique, educational project within the field of ethics and computers that was implemented in the undergraduate study of computer science in 2002. Nesna University College has been using the example of sexual abuse of children in case study teaching in social informatics, in order to create an environment for intrinsically-motivated learning within the field of ethics in computer science. The project also gave the students a unique opportunity to get involved both emotionally and practically in the field of social informatics. The project is run in cooperation with Save the Children Norway and the Norwegian National Crime Squad. The computer science education at Nesna University College is the only computer science education in the world which has sexual abuse of children as the main topic on the computer science curriculum. The computer science students provide both the Save the Children Norway and the National Criminal Investigation Service with reports on various topics such as secure chat, camera phones and possible abuse, Freenet as a tool for sexual abuse, and so on.

Keywords: didactics; ethical/societal issues; pedagogy; social informatics

TERMINOLOGY

The terms “Internet” and “digital media” as used in this article encompass the terms “World Wide Web” and “cyber-space.” The communication that is of concern here is what is accessed via chat rooms. The term “children” or “young people” is applied to people under 16

years of age. “Sexual abuse” is used in this article to describe both the activities by grown-ups to induce children in talking about sex with them in chat rooms, meet them for sex, and the distribution and use of child pornography. The term “child pornography” is defined as any visual depiction—including any photo-

graph, film, video, picture, or computer or computer-generated image or picture, whether made or produced by electronic, mechanical, or other means—of sexually explicit conduct where children are engaged, or made to look like they are engaged, in sexual activity. The term in Norway is often replaced with the term “abusive material,” so as to underline the fact that this material is not pornography as such. “Grooming” is a term describing the activity by a grown-up to gain the trust of a child with the intent of abusing him or her sexually. ICT stands for Information and Computer Technology.

INTRODUCTION

The last decade has seen a rapid development and growth in the use of computer-based communication and information sharing. Internet—or “the Net” as it is sometimes called—has proven to be perhaps the most popular mass-communication medium in the world. As with the phone and the television, most of the society has readily adopted the technology. Its spread internationally and its penetration into almost every corner of the educational system and family life, as well as work, is often described as a “revolution.” As one of the first countries outside the United States to be connected to the ARPANET, Norway has quickly developed its use of Internet from a purely researchers’ tool to being second on the list of European countries where Internet is used daily by its population. Children and young people in particular

have readily embraced the new communication medium, and they utilize it in quite a number of ways. A wide array of digital tools is enabling kids to express themselves, to create their own identities, and to personalize the media they use. Their creativity seems limitless and includes such various forms as mp3 lists, online game characters, digital movies, and blogs. Just take a look at www.youtube.com and see how kids place themselves in full view of the whole world, or check Web sites like the Norwegian “www.deiligst.no” (Delicious.no), where teenage girls and boys ask to be evaluated by their peers on their looks and bodies. Also, blogging is all the rage, and writing innermost thoughts online instead of in the old diary book might seem quite fun.

The problem with blogging is that children reveal more online than parents know, and they do it because they think that blogs are only read by their friends. No one ever told them that everything placed on the Net is visible for everyone. There are also similar problems with YouTube and sites like “Deiligst.no.”

Since the fall of 2002, the department of computer science at Nesna University College has been working with a project called “Getting Involved.” The project was a part of the undergraduate program in computer science and the course in social informatics. The project focused on child pornography and the Internet. In March 2003, Nesna University College signed an agreement with the Norwegian Save the Children

to work closely with them on this issue. Nesna University College is the only college in Scandinavia with this kind of project, and the only computer science program in the world which has put sexual abuse of children on its curriculum. In 2005, the agreement was renewed for another two years.

The main focus of the project was to try to fight the constant sexual abuse of children on the Internet with information and awareness projects directed both towards the computer students of Nesna University College and towards the local computer industry and local primary-, secondary-, and upper-secondary-level schools. A secondary focus was to get the students more involved in the various topics within social informatics, especially ethical topics, by using case study teaching. Our hope was that using this teaching method would liberate the students from their preconceived notion that social informatics is tedious and not practical, and that ethical themes are of no importance to a computer professional.

Information and computer technology has traditionally been conceived as a course closely connected to the natural and logical/mathematical sciences. Social informatics deviates from this point of view, and the late Dr. Rob Kling of Indiana University gave the following definition:

Social Informatics (SI) refers to the body of research and study that examines social aspects of computerization—including the roles of information technology in social and organizational

change, the uses of information technologies in social contexts, and the ways that the social organization of information technologies is influenced by social forces and social practices. (Kling, 2001)

In 2002 and 2003, Nesna University College had two courses in social informatics: SI-1, which was taught during the first year of the undergraduate program in computer science, and SI-2, which was taught during the third, and last, year. Many of the computer students dreaded the course in social informatics. “This is just about Marx. No practical computer stuff,” was one of many negative comments by computer students.

If the students felt the course unimportant and uninspiring, would they learn anything? In 2003, the Department of Computer Science decided to rebuild the course and make it more practical, with one topic as the main ethical theme. The theme we chose was child pornography on the Internet. We believed that this would be a much more inspiring and interesting topic for the students, instead of the normal topics of software piracy and “What are ethics?”

SI-2 was then organized into the following main topics:

- a. Computers and law,
- b. Computers and organizations, and
- c. Technological change.

The main topics were then developed into several smaller topics. The example of sexual abuse of children and the Internet

was the glue that kept all the topics in social informatics together. The students worked with different cases, ranging from computer forensics to problems concerning the introduction of ICT in an organization, privacy legislation vs. penal legislation, and the different tasks performed by the administrative computing services within an organization. While all the different cases were linked to the project, the main work consisted of writing reports at the request of Save the Children Norway and the National Criminal Investigation Service. In 2005, the students completed a report on the possible use of Freenet and anonymous proxies as tools for distributing images and films of sexual abuse of children, at the request from the National Criminal Investigation Service. Save the Children Norway and INTERPOL also expressed an interest in the report, and copies were distributed to these two organizations as well. The reports gave both Save the Children Norway and the National Criminal Investigation Service new knowledge, and this fact seemed to be a major factor in raising the motivation of the computer science students in completing the course in social informatics.

SEXUAL ABUSE OF CHILDREN IN DIGITAL MEDIA AS AN ETHICAL THEME

The Internet gives everyone the opportunity to be anonymous. You may be of any race, sex, or conviction and create your own "world." No one can see you, and this "invisibility" is just what makes the Internet a useful arena

for grown-ups who want to engage children in sexual activities. We see this quite clearly on chat sites for children, where not every nickname supposedly belonging to a 12-year-old boy is just that (Hansen, 2004).

Most children have been told not to meet—or to get into cars of—strangers. And some have also been told not to divulge personal information on the Internet, so as not to fall prey to grown-ups with evil intentions. Research done by Save the Children Norway reveals that children claim to be anonymous on the Internet (Save the Children Norway, 2003), but despite this, most of them still give their e-mail address and telephone number to people they are chatting with on the Internet. Children also believe that if they can speak to a person from a chat on the phone, it will be safer. According to some of the children that were interviewed by researchers from Save the Children Norway, using the phone will quickly divulge whether the person is 14 or 40. Despite this, there are a number of children in Norway who have been sexually abused by grown-ups that they first met on the Internet. The abuser had managed to develop trust in the child, and then suggested a meeting either at the abuser's own home or some other secluded place.

Sexual abuse might not only be the grooming of a child, leading on to sexual activities, but also the distributing of what is normally called "child pornography." The term is somewhat inadequate, as this has nothing to do with pornography, but is pictures, films, or

sound depicting criminal offense. The term “abusive material” has therefore replaced the old term in reports and lectures done by the police, Save the Children Norway, and other institutions working within the field of sexual abuse of children in digital media in Norway. Once a photo of a child being sexually abused is placed on the Internet, it will exist in “cyberspace” forever. It is therefore also important to educate both grown-ups and young people that for every curious click on such material, the abuse continues.

The choice of this theme as a tool for evolving ethical thinking in our students was made based on a notion that it would be a theme that touched our students’ hearts and minds, and a theme that would seem more important than the ethics concerning downloading illegal music, films, and software from Internet.

USING A TRUE PROJECT AS A TOOL FOR TEACHING ETHICAL ISSUES

In the beginning, the project was first and foremost connected to the course in social informatics, and it was primarily the ideas from Dr. Rob Kling, Professor Chuck Huff (St. Olaf College), and Dr. Tom Jewett (California State University, Long Beach) that provided the framework for the project. There are different ideas about what kind of knowledge the students in social informatics should acquire from completing this course, but I decided to formulate a set of goals based on the ideas of Dr. Rob Kling and

Dr. Tom Jewett (Jewett & Kling, 1996), which used Bloom’s taxonomy as a guide. Their views are that teachers in social informatics should try to anchor the professional and ethical focus of their courses to the immediate future of the students. The most important focus should be to help the students develop an analytical understanding and lifelong curiosity about social aspects of computing.

In Kling and Jewett’s view, it is not possible to teach social informatics step-by-step from a traditional textbook. They stated that students needed to get past the concept that there is a strictly-technical solution for all problems, and “the tacit assumption that they, as technologists, represent all users of technology. They need to deal carefully with ethical conflicts, not just assume that they know right from wrong by intuition alone” (Jewett & Kling, 1996). According to the ideas of Jewett and Kling (Jewett, 1996; Kling, 2001), one has to develop a set of objectives for the course, phrased in terms of student performance outcomes. These objectives are also a help in devising ways to assess performance (both teachers and students). Kling and Jewett focus on three ways of organizing these objectives:

- Describing outcomes
- Principles and skills
- Bloom’s taxonomy

Our objectives were that the students should attain a greater awareness of the

problem of sexual abuse of children and the use of ICT as a tool for both the abuser and victim, and learn about the different problems and challenges concerning social aspects of computing.

More specifically, we wanted our students to be able to debate the issues in an organized and coherent way, to develop their own views, and to be sensitized to the world around them. At the same time, there are of course certain facts that they should learn, just like in any other course. In the issue of privacy, for example, we expect them to know what the Privacy Information Act and the Data Inspectorate are. Bloom's taxonomy is a hierarchical framework of learning based on three domains: cognitive, affective, and psychomotor.

In the cognitive domain, there are six levels of knowledge: knowledge, comprehension, application, analysis, synthesis, and evaluation. In the affective domain, there are five levels:

- Receiving phenomena
- Responding to phenomena
- Valuing
- Organizing values
- Internalizing values

In the psychomotor domain, there are seven levels:

- Perception
- Readiness to act
- Guided response
- Mechanism
- Complex overt action

- Adaptation
- Origination

In the Norwegian Upper Secondary Schools, it is the six levels within the cognitive domain that are in use, and we therefore chose to concentrate on these six specific levels in our organizing of the objectives. What we found particularly interesting in using Bloom's taxonomy as a method for organizing our course in social informatics was that once you get past the three first categories and move to the last three categories, the students stop being neutral to the topic. Most students love to analyze and discuss, but some hate it. This reaction from the students might be because the learning now causes them to change their actions, behaviors, or beliefs. According to Bloom, it is at this point that real learning begins.

Our use of Bloom's taxonomy in organizing the course in social informatics closely follows Dr. Tom Jewett's course at CSULB, as described by Dr. Jewett and Dr. Kling (1996) in "Teaching Social Issues of Computing: Challenges, Ideas and Resources." The following few examples will illustrate the organization. The relevant Bloom levels are in parentheses:

- Helping the students to understand how controversies are represented: identify major concepts that authors use to frame their arguments (privacy vs. prevention of sexual abuse of children) and identify specific arguments which are based on these

concepts (Bloom: Comprehension).

- Get the students to determine the impacts of specific personal and professional work activities (including systems design) on coworkers, employers, clients, system users, and society in general (Bloom: Evaluation). For example: The impact of instituting surveillance of e-mail and other ICT use of employees in order to prevent violations of computer security rules and illegal activities, which was unforeseen by the implementers. Or design computer-based systems for application procedure that demands privacy information in every case, regardless of the principles of the Privacy Information Act.
- Use electronic media such as e-mail and bulletin boards, observing appropriate “netiquette,” and similar conventions (Bloom: Application). In our course, the students and the lecturers used Moodle to participate in online discussions about sexual abuse of children and the use of ICT with the author and lawyer Andrew Vachss in New York.

As can be seen in these examples of how we used Bloom’s taxonomy as a guide for teaching social informatics, the project was meant to provide a unifying thread through the whole course. After deciding the objectives of the course as described above, the example of sexual abuse of children and the use of Internet

as a tool for abusers to get in contact with children and distributing pictures and films of sexual abuse, were implemented as the main theme. Through seminars, online discussions, and ordinary lectures, and using representatives from Save the Children Norway, the Norwegian National Crime Squad and the author and lawyer Andrew Vachss as lecturers and debaters, the students explored such topics as personal privacy, ICT and law, ICT and ethics, seizing and securing electronic evidence, ICT and organizational theory, and ICT and politics. To ensure that theory was integrated with practical work, the students had to do a project based on tasks given them by Save the Children Norway and the Norwegian National Crime Squad. It is not unproblematic to introduce materials that might provoke strong feelings and make it an integrated part of a course. First, we had to be absolutely sure that all materials used in the course were not against the law. All the work of our students was closely monitored and the work itself was conducted within predefined rules. No students were allowed to actively search for illegal materials, nor enter Web sites that might contain such materials. This of course made some of the assignments harder to do, but so far the students have solved that problem by collecting and analyzing general information gathered from the Internet.

Let us take a closer look at one example of a typical assignment in social informatics at Nesna University College.

Freenet: A Tool for Privacy or Abuse?

In 2005, our students were given an assignment from the Norwegian representative at INTERPOL concerning Freenet. Three student groups chose to work on this assignment. Freenet is free software, developed for the Windows and Unix/Linux platforms, which makes it possible to publish and obtain information on the Internet anonymously. Freenet is a decentralized peer-to-peer distributed data store aiming to provide electronic freedom of speech through strong anonymity. Users contribute to Freenet by giving bandwidth and a portion of their hard drive (called the data store) for storing files. Unlike other peer-to-peer file sharing networks, Freenet does not let the user control what is stored in the data store. Instead, files are kept or deleted depending on how popular they are, with the least popular being discarded to make way for newer or more popular content.

Files in the data store are encrypted to enable Freenet users to deny any knowledge of the content stored on their computers. The same technology that allows the anonymous to communicate with a large group without the publisher's identity being revealed can also allow illegal material such as child pornography to be shared with anyone. This makes Freenet ideal as an example of the problems of social control vs. individual privacy. According to the Freenet developers, the system is used for the distribution of censored information all over the world including

countries such as China and the Middle East (Freenet Project, 2006). If this is true, we might readily agree that such use of Freenet is laudable. One might of course discuss how effective the system is as a tool for promoting democracy through spreading uncensored information, for instance, in China, or whether this is just another good idea, but without any significant impact. But that would be outside the scope of this article. Freenet's founders argue that only with true anonymity comes true freedom of speech, and that what they view as the beneficial uses of Freenet outweighs its negative uses.

In this assignment, we discussed with the students the various problems concerning society's rights to protect itself and its citizens, and the right to individual privacy. We also discussed the possibilities of misuse, and the students discovered several instances of Freenet links pointing to what was "advertised" as child pornography. Due to Norwegian penal code and the rules for doing student assignments in this project, the students were prohibited from checking if the material really contained child pornography, and the possible misuse of Freenet had to be based on assumptions and analysis of available information. Despite the drawback of not being able to verify all the information that was collected, the computer science classes of 2003 and 2005 provided both the Save the Children Norway and the National Criminal Investigation Service (including INTERPOL) with reports on vari-

ous topics such as secure chat, camera phones and possible abuse, Freenet and proxies as tools for sexual abuse, and so on. The responses from both the Save the Children Norway and the National Criminal Investigation Service have been enormously positive, and both organizations have declared that the reports contributed new knowledge on how information technology could be used by abusers and victims in cases of sexual abuse.

THE PROJECT AS A TOOL FOR MOTIVATION

Students, like all human beings, are inherently active and curious. The desire to learn something new, to explore and discover, is intrinsic to the nature of us all. Still, those of us who have been working in the field of teaching for a longer period of time have more than once witnessed students who seem to be completely disinterested from day one, or who lose interest during the course. And this is especially true for informatics students who suddenly have to divert their attention from fascinating technical issues to ethical themes.

There are many theories of what motivates people, but in this particular project, the work on intrinsic motivation and self-determination by Deci and Ryan (1985) was central. Self-determination theory is an approach to human motivation and personality that investigates the basis for people's self-motivation and personality integration (Ryan & Deci, 2000). Motivation was

also an important factor for Jewett and Kling (1996):

Our objective, then, is to design a course—select topics, materials, and activities—which will develop the students' internal motivation toward the course. At the minimum, we want to reach them in a way that will resonate with their own interests. At best, we want each student to have a sense of discovery—to find a new and exciting way of understanding computerization in their personal and professional lives.

Jewett and Kling's focus on internal and external motivation corresponds with Deci and Ryan's work on intrinsic motivation and self-determination (Deci & Ryan, 1985; Ryan & Deci, 2000).

Many students are naturally enthusiastic about learning, but there are also some that need their instructors to inspire, challenge, and stimulate them. They want to learn, but they also want to feel that learning is meaningful for them and their situation:

Do you, as a teacher, know what meaningful knowledge is? Do you, as a teacher, know what kind of knowledge is important to me as a student? The question is difficult, but if you have no answers, why should I be your student? (Dale, 1989)

Unfortunately, there is no single magical answer to these questions, but in my view, we are a long way towards an answer if we are able to involve both the hearts and minds of our students.

There are many factors that affect the student's motivation to work and to learn: interest in the subject matter, perception of its usefulness, general desire to achieve, self-confidence and self-esteem, and patience and persistence. But not all students are motivated by the same values, needs, or desires. Some of the students will be motivated by extrinsic incentives: the approval of others, overcoming challenges, and so on. The challenge for me as a teacher in social informatics was to address the students in such a way as to enhance their intrinsic motivation for learning. This was important because research has shown us that intrinsically-motivated learning is superior to extrinsically-motivated learning (Deci & Ryan, 1985).

The use of Project Getting Involved as a motivational tool was based on a study by Benware and Deci in 1984, where the results indicated that the subjects who learned a subject with expectation of putting their learning to active use were more intrinsically motivated than those who learned without that expectation. One of the main focus points of Project Getting Involved was to make the students active participants in learning social informatics. As already described, the students used their learning to develop reports for the Save the Children Norway and the National Criminal Investigation Service. In other words, they used their acquired knowledge in a practical way, thereby providing new knowledge to the participating organizations and experiencing that working with ethical themes

is useful in connections with information technology. It was our hope that introducing the case of sexual abuse of children would create an environment for intrinsically-motivated learning, where the students would develop a true curiosity about the various topics in social informatics. One quote from a student gives an indication that we might have been successful in creating the desired motivational orientations, at least as far as this student goes: "The assignments motivated me greatly because it is more fun to work for others than just learning various stuff."

LESSONS LEARNED

The subject of sexual abuse of children is extremely sensitive and still considered taboo by some. With Project Getting Involved, we want to make our computer students aware of two things:

- You should refrain from viewing materials on the Internet that depict sexual activities with children, as every click on such material continues the abuse of the child involved.
- Children may be targeted by abusers online, and creating awareness of that fact might be a tool in the fight against sexual abuse of children in digital media.

In doing so, we have had to be careful not to overdramatize the dangers, nor raise an accusing finger at people who do not want to know too much about this difficult topic, or parents who for

some reason do not take an interest in the Internet and computers.

It is not unproblematic to introduce materials that might provoke strong feelings and make it an integrated part of a course. We have to be absolutely sure that all materials used in a course are not against the law. In Project Getting Involved, all students' work was closely watched, and the work itself was within predefined rules. No students were allowed to actively search for illegal materials, nor enter Web sites that might contain such materials. This of course made some of the assignments harder to do, but so far, the students have solved that problem by collecting and analyzing general information gathered from the Net.

We were also concerned with the possibilities of students that were themselves former victims of sexual abuse, and students who were abusers, either directly or as users of child pornography. Nesna University College has both a social worker and a psychologist at the student's disposal, and we therefore felt that we had the expertise at hand if needed. We were also prepared to spend an extra amount of time with the students talking to them about sexual abuse, and the importance of having knowledge in order to fight this problem.

The ordinary student of Norwegian higher education has spent 12 years in school (primary, secondary, and upper-secondary level), the typical male student has served for 6 to 12 months in the National Service, and some of the students also have experience from dif-

ferent lines of work, prior to applying for higher education. Most of the students are therefore mature grown-ups, and some are already parents themselves. These factors make it easier to introduce offensive materials as a part of social informatics, and the reactions from the ordinary student has so far been that of anger, and a strong dedication to help fight child pornography.

This, however, is no guarantee that students who themselves have been victims of sexual abuse will cope with having to work with this theme, and thereby reliving the horror of the abuse. Since the project started in 2002, we have had two instances of students whose reactions to the project were based on this kind of experience. Both were taken care of and given special follow-ups, and both were able to continue working within the project.

Despite real and imagined challenges concerning the use of sexual abuse of children in digital media, we still think it is of great importance to continue this project within our undergraduate studies in computer science. In an increasingly globalized world, we should also strive to make computer education more global, with global-ethical themes (Kirkwood, 2001) that are recognizable and relevant both nationally and internationally. The ethical implications of the widespread use of the Internet might be both enormous and, to some extent, still unknown (Bynum, 1998). To fight sexual abuse of children in digital media using project-based teaching in relevant fields of education

is just such an example of a global-ethical theme. And it is a theme that exemplifies one of the challenges as for ethical issues in the information age. In some cultures, erotic pictures of preteen kids are allowed (Web sites containing teen models—USA), while in others, it is considered to fall within the law of child pornography (any picture placing a minor in a situation that could be interpreted as sexual—Norway). In such instances, whose laws and values should apply? The theme of sexual abuse of children on the Internet is a theme that contains many of the important questions we as users of Information Technology are faced with. Is any picture of a naked, or half-naked, kid on the Internet an abusive picture? Are all contacts between grown-ups and kids on chat a potential abusive situation, and if so, should it lead to immediate surveillance of the grown-up? Are individual rights to privacy an obstacle to the protection of kids online?

Project Getting Involved is now an integrated part of computer science education at Nesna University College, and the fight against sexual abuse of children and the use of ICT to distribute this kind of criminal content has been elected as the main ethical profile of the college. We hope that this project will be a tool in our teaching of computer ethics that, to some extent, will help our students to identify and analyze some policy vacuums, and perhaps even find solutions that might resolve them.

I think we have succeeded in making social informatics interesting, and in

getting our computer students involved with most of the aspects of this course, especially the ethical ones. We have also succeeded in providing our computer students with knowledge about sexual abuse of children and the use of ICT by both victim and abuser. Lastly, we gave the students a unique opportunity to get involved both emotionally and practically in the field of social informatics, and to make an impact, however small, in the continuing fight against sexual abuse of children in digital media.

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REFERENCES

- Bynum, T.W. (1998). *Ethics and social policy in the information age*. Retrieved from http://www.southernct.edu/organizations/rccs/resources/research/global_info/bynum_info_age.html
- Dale, E.L. (1989). *Pedagogical professionalism, on the identity and use of pedagogic*. Oslo, Norway: Gyldendal.
- Deci, E.L., & Ryan, R.M. (1985). *Intrinsic motivation and self-determination in human behavior*. New York: Plenum Press.
- Freenet Project. (2006). *What is Freenet?* Retrieved October 8, 2007, from <http://freenetproject.org/whatis.html>

- Hansen, A.-A. (2004). *Children who meet abuser online*. Author. from Indiana University Web site: <http://rkcsi.indiana.edu/>
- Jewett, T., & Kling, R. (1996). *Teaching social issues of computing: Challenges, ideas and resources*. Retrieved October 8, 2007, from <http://www.cecs.csulb.edu/~jewett/teach/teach.html>
- Kirkwood, T.F. (2001). Our global age requires global education: Clarifying definitional ambiguities. *SocialStudies*, 92(1), 10.
- Kling, R. (2001). *Conceptions of social informatics*. Retrieved October 8, 2007, Save the Children Norway. (2003). *Everyone is lying on the Internet—and everyone knows it. Young persons and the Internet*. Author.

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