TAMPERE UNIVERSITY OF TECHNOLOGY

MAARIT SÄRKILAHTI
ONLINE COURSE SAFE AND SUSTAINABLE SANITATION:
FACTORS AFFECTING STUDENTS' SATISFACTION IN AN
e-LEARNING ENVIRONMENT
Master of Science Thesis

ABSTRACT

Since the beginning of the 2000's the Environmental Engineering and Biotechnology Laboratory, Tampere University of Technology, has offered online courses. During the academic year 2010-11 four online courses were organized and one of them was Safe and Sustainable Sanitation. The course is based on scientific work presented at the International Dry Toilet Conference. The goals of the conference based online course include a distribution of the latest sanitation knowledge to a wide audience and a maximum exploitation of the scientific work presented in the conference. The course is aimed at advanced M.Sc. students, Ph.D. students and postdoctoral students from Finnish and international universities as well as sanitation professionals. All together 218 students from 37 different countries have participated in the course.

The course has been offered for five times (2006-10) and after each course realization, student feedback has been collected with an online questionnaire. In the empirical part of the thesis, student feedback was analyzed using both, qualitative and quantitative methods. In addition to the basic statistical analysis, data was classified in order to indicate factors affecting student satisfaction. The aim of the study was to describe the exceptional character of the online course and point out the development needs. Another concern was the online course cooperation with other higher education institutions.

Students appreciated the international atmosphere of the course, which included interdisciplinary and multicultural group of lecturers and students and interaction among the learning community. Another acknowledged factor was the up-to-date course content. Students also appreciated the flexibility of e-Learning. Participation on online community emerged to be contradictory to the freedom. While heterogeneity in terms of different educational, professional and cultural backgrounds is a great advantage, heterogeneity in the level of education (bachelor, master or PhD student) and motivation to study is a challenge. Tutoring was found to be a key for enhancing e-Learning. From an institutional viewpoint the problem is that there are no formal regulations for virtual exchange and practices vary from one university to another.

To assure the course quality also in future, it is necessary 1) To seek equilibrium between temporal freedom and participation on the online community. A possibility to choose between individual and group work could be provided. 2) To use enough resources for course updating, managing, teaching and tutoring as well as to look for the tools, which maximize the efficiency of the teachers' work. 3) To consider student background when developing the course. To whom is the course aimed and what is the background knowledge and motivation? 4) To improve online course cooperation in order to guarantee international interaction on the course as well as to participate on the international online course benchmarking.

TIIVISTELMÄ

TAMPEREEN TEKNILLINEN YLIOPISTO
Ympäristö- ja energiatekniikan koulutusohjelma
SÄRKILAHTI, MAARIT: Opiskelijatyytyväisyyteen vaikuttavat tekijät verkkokurssilla Safe and Sustainable Sanitation (Turvallinen ja kestävä sanitaatio)
Diplomityö, 78 sivua, 8 liitesivua
Kesäkuu 2011
Pääaine: Vesi- ja jätehuoltotekniikka
Tarkastaja: professori Tuula Tuhkanen
Avainsanat: konferenssiin perustuva verkko-opetus, turvallinen ja kestävä sanitaatio, opiskelijatyytyväisyys, yliopistojen välinen verkkokurssiyhteistyö, opiskelijapalaute

Tampereen teknillisen yliopiston (TTY) Bio- ja ympäristötekniikan laboratoriossa on kehitetty ympäristötekniikan verkko-opetusta 2000-luvun alkupuolelta saakka. Lukuvuonna 2010-11 laboratorio tarjosi opiskelijoille viisi verkko-opintojaksoa: Päästöjen ympäristövaikutukset (3 op), Environmental Effects of Pollution (3 op), Fundamentals of Environmental Risk Analysis (5 op), Safe and Sustainable Sanitation (3 op) ja Water Risk Management (3 op). Verkkokursseille osallistuu paljon ulkomaalaisia opiskelijoita, joista suurin osa opiskelee Suomessa ERASMUS-vaihdon piirissä. Lisäksi "virtuaalivaihto-opiskelijoita" tulee laboratorion yhteistyöyliopistoista, jotka ovat vaihtosopimusten ulkopuolella. Vierailevien opiskelijoiden osallistuminen kurssille on hallinnollisesti ja taloudellisesti kiemuraista. Virtuaaliselle vaihto-opiskelulle ei ole valmiita sopimuspohjia eikä suorituksia ole kirjattu TTY:n rekisteriin. Yhteistyöyliopistojen opiskelijoita on kuitenkin haluttu ottaa mukaan kursseille, koska kansainvälinen oppimisympäristö on tarjonnut opiskelijoille mahdollisuuden "kotikansainvälistymiseen" ja työelämässä tarvittavien vuorovaikutustaitojen opiskeluun.

Tässä tutkimuksessa keskityttiin englanninkieliseen verkkokurssiin Safe and Sustainable Sanitation (SSS), Turvallinen ja kestävä sanitaatio, joka perustuu kansainvälisen kuivakäymäläkonferenssin materiaaleihin. Kansainvälinen kuivakäymäläkonferenssi järjestettiin kansalaisjärjestö Huussi ry:n johdolla ja tamperelaisten yliopistojen yhteistyöllä vuosina 2003, 2006 ja 2009. Bio- ja ympäristötekniikan laboratorio järjesti vuosina 2006 ja 2009 konferenssia edeltävän työpajan, jossa sanitaatioalan asiantuntijat alustivat ajankohtaisista aiheista. Luennot videoitiin ja luennoitsijat allekirjoittivat sopimuksen, jolla he luovuttivat materiaalit verkkokurssilla käytettäviksi. SSS-kurssin teemoja olivat sanitaation historia, terveys ja turvallisuus, kuivakäymäläjätteen käyttö lannoitteena, tekniset ratkaisut, sosio-ekonomiset näkökohdat ja kehitysyhteistyö. Kurssin opetus koostui videoluennoista, lukumateriaaleista sekä viikkotehtävistä, joissa pyrittiin keskustelevaan yhteistyöhön kurssilaisten kesken. Kurssi toteutettiin kokonaan etäopintoina aluksi A&O- ja myöhemmin Moodle-verkkoympäristössä. Vuosina 2006-10 kurssin suoritti 218 opiskelijaa 37 eri maasta. Noin puolet opiskelijoista oli suomalaisia.

Diplomityön tavoitteena oli selvittää SSS-kurssin erityispiirteet. Kurssia tarkasteltiin laajasti sisällön, teknisen toteutuksen sekä opiskelijayhteisön näkökulmista. Opiskelijatyytyväisyyskyselyjen perusteella arvioitiin kurssin vahvuudet sekä kehityskohteet. Lisäksi pyrittiin avaamaan keskustelua virtuaalisen vaihto-opiskelun

vakiinnuttamisesta. Aineistosta nostettiin myös kurssipalautteen keräämistä, käsittelyä ja hyödyntämistä koskevaa tietoa. Tutkimuskysymykset olivat: Mikä tekee SSS-verkkokurssista hyvän? Miten kurssia voisi parantaa? Mikä on verkkokurssin potentiaali virtuaalisessa vaihto-opiskelussa? Kuinka opiskelijapalautteen keräämistä, käsittelyä ja hyödyntämistä voisi tehostaa?

Tutkimusaineistona käytettiin vuosittain verkkokyselyllä kerättyä opiskelijapalautetta. Aineisto analysoitiin sosiaalitieteen määrällisiä ja laadullisia menetelmiä käyttäen. Kyselyn monivalintakysymyksillä selvitettiin opiskelijoiden arviot kurssin eri osista kuten sisällöstä, rakenteesta, ohjeista, opettajista, opetusmateriaaleista ja viikkotehtävistä. Vastaukset esitettiin taulukkoina, joista kävi ilmi opiskelijatyytyväisyys kurssin eri osiin vuosittain. Ristiintaulukoinnilla selvitettiin eri koulutustaustojen vaikutusta opiskelijatyytyväisyyteen. Kyselyssä kerätty avoin palaute analysoitiin luokittelemalla palaute aineistossa usein esiintyneiden teemojen mukaisiin luokkiin. Luokittelu oli nk. uutta kartoittavaa luokittelua, koska luokat perustuivat pääosin tutkimusaineistoon eivätkä kirjallisuuteen. Tutkimustulokset eivät tukeneet täysin kirjallisuudessa esitettyjä luokkia. Tutkimus oli ohjaavaa tapaustutkimusta, koska tutkija osallistui kurssin toteutukseen ja keräsi aineistoa myös opettajan roolissa. Ohjaavan tutkimusotteen päämääriin kuuluvat parannusehdotukset, jotka esitetään listana diplomityön viimeisessä luvussa.

Opiskelijat olivat tyytyväisiä verkkokurssin kansainväliseen ilmapiiriin, johon kuuluivat erilaisia tieteenaloja ja kulttuureja edustavat luennoitsijat sekä heterogeeninen opiskelijayhteisö. Opiskelijat kokivat oppivansa vuorovaikutuksessa toisten opiskelijoiden kanssa ja yksi opiskelija kommentoikin kurssilla keskusteltavan enemmän kuin keskimäärin suomalaisessa lähiopetuksessa. Toinen tekijä, joka teki verkkokurssista hyvän, oli sen ajantasainen sisältö. Opiskelijat arvostivat vaihtoehtoista sanitaatiota käsittelevää kurssia, koska sillä pyritään tarjoamaan uusia mahdollisuuksia vakiintuneiden ratkaisujen rinnalle. Kolmas kurssin menestystekijä oli muidenkin verkkokurssien etu, joustavuus. Opiskelijat voivat seurata luentoja ja tehdä tehtäviä oman aikataulunsa mukaan ilman sitoutumista tiettyyn paikkaan ja aikaan. Joustavuus ja kurssisisältö esiintyivät myös aiemmassa kirjallisuudessa verkkokurssityytyväisyyttä parantavina tekijöinä. Aiemmissa tutkimuksissa painotettiin myös verkkokurssin opiskelijayhteisön merkitystä. Kansainvälisyys, konferenssiin ympäri maailman saapuneet tutkijat ja monikulttuurinen opiskelijajoukko olivat SSS-kurssin erityispiirre, joka poikkesi aiemmasta kirjallisuudesta.

Verkko-opintojen vapaus ajasta ja paikasta törmäsivät opiskelijapalautteessa vuorovaikutusta edellyttäviin ryhmätöihin ja verkkoyhteisössä toimimiseen. Molemmat ovat kurssin hyviä puolia, mutta niiden yhdistäminen on haastavaa. Eri elämäntilanteissa olevilla opiskelijoilla on erilaisia tarpeita ja kurssin järjestäjän pitäisi huomioida niitä mahdollisuuksien mukaan esimerkiksi tarjoamalla mahdollisuus suorittaa harjoitustöitä ryhmän lisäksi yksin. Toinen opiskelijatyytyväisyyttä alentanut tekijä oli opiskelijoiden vaihteleva koulutustaso. Kun kulttuurien ja koulutusalojen kirjo paransi kurssin laatua, koulutustasojen kirjo laski sitä. Kurssin kohderyhmänä olivat maisterivaiheen opiskelijat, tohtoriopiskelijat ja akateemisesti koulutetut sanitaation ammattilaiset. Kurssille kuitenkin otettiin myös kandidaattivaiheen opiskelijoita, jotka eivät aina menestyneet kurssilla. Kurssin pysti läpäisemään kevyillä lähtötiedoilla, mutta aloitteleva opiskelija ei pystynyt panostamaan vuorovaikutusta edellyttäviin tehtäviin samalla tavalla kuin edistyneet opiskelijat. Epätasainen panostus ryhmätöihin, toisten töiden kommentointiin ja keskusteluihin turhautti edistyneitä ja motivoituneita opiskelijoita. Lähtötason lisäksi heikko panostus kertoi alhaisesta motivaatiosta, jolloin kurssin järjestäjän haasteena oli motivoituneen opiskelijaryhmän muodostaminen ja

motivaation ylläpito. Keskeinen tekijä kurssin ongelmien ratkomisessa ja opiskelijatyytyväisyyden takaamisessa oli ohjaus tai tutorointi, jolla tarkoitetaan ohjaajan virallisia ja epävirallisia ohjeita opiskelijoille. Ohjaajien tiivis yhteydenpito opiskelijoihin oli tärkeää erityisesti teknisten ongelmien ratkomisessa ja opiskelijayhteisön muodostumisessa.

Virtuaalisen vaihto-opiskelun epävirallinen asema ei suoraan vaikuttanut opiskelijatyytyväisyyteen. SSS-kurssin erityispiirteen, kansainvälisen ilmapiirin, kannalta yliopistojen välisen verkkokurssiyhteistyön kehittäminen on kuitenkin tärkeää. e-ERASMUS -tyyppiset sopimukset edellyttävät päätöksiä yliopiston, valtion ja kenties EU:n tasolla. Pienemmilläkin askelilla voidaan kuitenkin edetä oikeaan suuntaan, eli tarjota ympäristötekniikan opiskelijoille mahdollisuuksia opiskella eri yliopistojen järjestämillä verkkokursseilla ja tavoittaa opiskelijat, jotka haluavat osallistua Bio- ja ympäristötekniikan laboratorion verkkokursseille. Ympäristötekniikan verkkokursseja voidaan sisällyttää osaksi toimivia opetusverkostoja Suomessa ja ulkomailla. SSS-kurssilla on potentiaalia myös yhteistyöhön kehitysmaiden yliopistojen kanssa. Verkostoituminen ja jopa hallinnon ulkoistaminen pois kurssijärjestäjältä on Suomen sisällä mahdollista joustavan opinto-oikeuden JOO-sopimuksen mukaan. Yli Suomen rajojen tähtäävä verkostoituminen on toistaiseksi kurssijärjestäjän henkilökohtaisten kontaktien varassa ja työ tehdään ohi yliopistobyrokratian. Arviolta kolmasosa SSS-suorituksista kirjataan vain opiskelijoille lähetettäviin todistuksiin, eikä yliopiston rekisteriin. Epäviralliset käytännöt tekevät opetustyöstä näkymätöntä, jolloin resurssit eivät ohjaudu työmäärän mukaan.

SSS kurssilla opiskelijapalautetta kerätään paljon, mutta laatuun ja palautteen analysointiin sekä käyttöön tulisi kiinnittää enemmän huomiota. Kysymyslomaketta voisi tiivistää, koska tärkein palaute saatiin avoimista kysymyksistä. Lisäksi palautetta voisi kerätä systemaattisesti jo kurssin kuluessa itsearviointiin kannustavien viikkotehtävien ja ohjaustilanteiden kirjaamisen muodossa. Palaute tulisi analysoida lyhyesti kurssin jokaisen toteutuskerran jälkeen ja ennen uutta toteutuskertaa tai kurssin uudistamista järjestävän tiimin tulisi pitää kokous, jossa edellinen palaute käsitellään. Safe and Sustainable Sanitation -kurssin laadun takaamiseksi on suositeltavaa: 1) Etsiä tasapainoa itsenäisen ja joustavan opiskelun sekä opiskelijayhteisön vuorovaikutuksen välille. 2) Varata riittävästi resursseja kurssin toteuttamiseen ja päivittämiseen. 3) Pohtia ja rajata kurssin kohderyhmä tarkoituksenmukaisesti. 4) Kehittää verkkokurssiyhteistyötä, jotta kurssin kansainvälinen ja vuorovaikutteinen luonne säilyy. Työn johtopäätöksissä esitettiin yksityiskohtainen suosituslista, jota käytetään kurssin kehittämiseen. Syksystä 2011 alkaen SSS on osa suomalaisten yliopistojen välisen yhteistyöverkoston (UniPID, Finnish University Partnership for International Development) verkossa suoritettavaa sivuainekokonaisuutta. Tulevaisuudessa olisi tarpeen luoda toimivia käytäntöjä yli Suomen rajojen ulottuvaan virtuaaliseen vaihto-opiskeluun.

PREFACE

When the online course Safe and Sustainable Sanitation was organized for the first time, I had just begun my studies in the Tampere University of Technology. At that time I was working full time and I was happy to participate on a distance learning course. Apart from the e-Learning flexibility, I was impressed by the international atmosphere of the course. When analyzing the student feedback, I also read my own comments from five years back.

The research presented in this thesis was started in the summer 2009, when I was hired to assist with the third International Dry Toilet Conference. I found the work very rewarding. The conference opened my eyes to the current sanitation situation that is everything but sustainable. Billions of people around the world don't have access to a safe sanitation and a water based sanitation, while being insane, seems to be the only widely accepted solution.

Since autumn 2010 I have worked as an assistant and become aware of the practical arrangements and tutoring work required in an online course. The tutor has probably learned more than the students during the fifth course implementation.

I would like to express my sincere appreciation to my supervisor, Professor Tuula Tuhkanen for her inspiring enthusiasm towards sustainable sanitation and online education. Without her experienced supervising, the thesis would not have been completed in time and it would have been twice the recommended length. I would also like to extend my special thanks to Professor Thomas H. Hatfield (Department of Environmental and Occupational Health, California State University Northridge CSUN). He gave me valuable comments regarding online course development and role of student feedback.

I want to thank Systems Analyst Pasi Häkkinen (Mathematics, TUT) for his helpful attitude. He has helped with online course practices as well as with a student feedback that disappeared to the cyber space. Similarly, I would like to thank the online course lecturers and active students for making the online course Safe and Sustainable Sanitation a course to be proud of.

Finally, I would like to thank my family, Soini Särkilahti and Veini, who was born between the beginning and the end of the research project. They let me write when necessary and more importantly, they took me to play football every once in a while.

25 May 2011

MAARIT SÄRKILAHTI

CONTENTS

ABBREVIATIONS AND NOTATION

CIMO	Centre for International Mobility
DT	Dry Toilet
EC	European Commission
EnSTe	Finnish Doctoral Program in Environmental Science and Technology
ERASMUS	EuRopean Community Action Scheme for the Mobility of University Students
EU	European Union
GESS	Graduate School in Environmental Stress studies
HEI ICI	Higher Education Institutions Institutional Cooperation Instrument
ICT	Information and Communication Technology
JOO	Flexible Study Rights Agreement
NGO	Non-governmental organization
REVE	Real Virtual Erasmus
SEI	Stockholm Environment Institute
SENSE	Socio-Economic and Natural Sciences of the Environment
SMIL	Synchronized Multimedia Integration Language
SSS	Safe and Sustainable Sanitation
TUT	Tampere University of Technology
TAMK	Tampere University of Applied Sciences
UniPID	Finnish University Partnership for International Development

1 INTRODUCTION

The first half of 2000's was the era when e-Learning was embedded into the Finnish higher education. With the support of an earmarked virtual university funding from the Ministry of Education in 2001-2006 several online activities were developed, including four online courses of the Environmental Engineering and Biotechnology Laboratory, in Tampere University of Technology (TUT). At the same time strategies regarding e-Learning were made. In 2006 the management group of Virtual University published their visions of how information and communication technology (ICT) would be used in TUT in 2009. Among other visions, it was described that management of online student registrations would be clarified and TUT would cooperate with the networks necessary in teaching and learning.

Virtualization of the higher education has not progressed as expected (Szucs 2009). Courses are organized, but official practices of virtual exchange studies are missing (REVE). During the academic year 2010-11 four online courses were organized by the Environmental Engineering and Biotechnology Laboratory as a part of the curriculum: Environmental Effects of Pollution (3 ECTS credit points) in English and in Finnish, Fundamentals of Environmental Risk Analysis (5 credit points), Safe and Sustainable Sanitation (3 credit points) and Water Risk Management (3 credit points). Besides the students of TUT there were ERASMUS students studying in Finland and students from other Finnish as well as foreign higher education institutions (HEI's) taking the courses.

The case studied in this research - Safe and Sustainable Sanitation (SSS) - has been organized by the Environmental Engineering and Biotechnology Laboratory since 2006. The Laboratory is one of the organizers of the International Dry Toilet (DT) Conference which is held every third year in Tampere. The Laboratory has used an opportunity of having international experts in Finland to organize the pre-conference workshop "Safe and Sustainable Sanitation" where the most distinguished researchers taking part in the conference give lectures. These lectures are recorded and used on the web course together with assignments and other learning materials used at the workshop. The goals of the conference based online course include distribution of the latest sanitation knowledge to a wide audience and maximum exploitation of the scientific work presented in the conference. Equality among the participants is also an important aspect. *Via* a free online course, university students can have equal access to recent scientific knowledge, even if they cannot afford taking part in the conference. This especially benefits students from less favored countries. It is also aimed at enhancing knowledge exchange between north and south. One advantage of this type of

course arrangement is the quality of the course material, which is guaranteed by a peer review of the conference papers.

This thesis has been inspired by success and potential of the online course SSS in the global world of higher education. International atmosphere of the course allows students to practice their skills in multicultural learning environment. Internationalization requires higher education to design opportunities which focus on skills needed to develop a global imagination (Rizvi 2001, According to Coryell *et al.* 2010). Internationalization from home should be developed, because not all the students can invest money and time to study abroad (Coryell *et al.* 2010). In Finnish universities a more prompt graduation is aimed and studying times have started to be restricted. Online exchange studies, or virtual mobility of the students, offer one opportunity for quick internationalization from home.

In the literature review (Chapter 2) higher education globalization and internationalization are presented and e-Learning in connect to that context. In addition, e-Learning theories and tools are presented in order to find best practices for e-Teaching and e-Learning. Current theories of learning argue that effective learning is learner, knowledge, assessment and community centered (Anderson 2004). When creating successful online courses, roles of learning community and tutoring are highlighted (Lindfors 2010) together with meaningful use of right ICT (Davidson & Waddington 2010). In previous studies (Sun *et al.* 2008) factors affecting student satisfaction have included the course content, technical design which affects usefulness and ease of use of a course, diversity in assignments, e-Learning course flexibility and attitudes – learner computer anxiety and instructors' attitudes towards e-Learning.

An empirical part of the thesis (Chapter 4 Results) focuses on student satisfaction in the e-Learning environment. SSS student feedback has been collected after each course implementation (2006, '07, '08, '09 and '10). It is assumed that student's feedback has a key role in course development. In university teaching, there is a trend towards students own responsibility about learning process. In this light student feedback is extremely important; students have the knowledge how they best reach learning goals and teachers/tutors should help the students by offering suitable learning tools and support. Both quantitative and qualitative methods of social sciences are used to analyze the student feedback. Materials and methods are presented in the Chapter 3. In Chapter 5 (Reflections and Conclusions) findings of the empirical part are reflected to the existing theory.

The first aim of the research is to describe the exceptional character of the online course Safe and Sustainable Sanitation by indicating the factors affecting the student satisfaction. The second aim is to point out general and special problems of the course as well as development needs. The third aim is to connect the results to the wider picture of HEI cooperation in e-Learning. Research questions are:

- What makes Safe and Sustainable Sanitation a successful course?
- What should be changed or developed for next version?
- How collection and usage of student feedback could be developed?

- What is the potential of SSS for virtual exchange?

Recommendations for course development (Chapter 6) are presented in a form of a "To do"-list, which facilitates systematic course quality enhancement. The version 2 will be extended in 2011 to correspond with the requirements (5 credit points) of the Finnish University Partnership for International Development (UniPID). These recommendations are taken into consideration when the version 3 is developed for autumn 2011 as well as in 2012 when the next DT conference takes place and the course material will be renewed again to correspond with current issues of sanitation (version 4).

2 LITERATURE REVIEW

The world of higher education is rapidly changing in the beginning of the 21st Century. According to Gül *et al.* (2010) the main trends include, but are not limited to, internationalization, massification, diversity, ICT revolutions, increased competition and collaboration, marketization, and new teaching and financing methods. ICT revolution and internationalization can be seen as driving forces for e-Learning and they are therefore the most relevant trends regarding this study. Also new teaching methods are interesting in this context. The aim of this chapter is to offer an overview of the current literature handling these trends and their effect on e-Learning.

Firstly, globalization and internationalization of higher education are discussed. Then the concept of virtual mobility is described and its current state is explained. The second part of the chapter focuses on e-Learning: its position in higher education, learning theories and learning tools. Finally, student feedback as a tool for quality assurance is considered.

2.1 Cross-national research in higher education

There are two frames of cross-national research in higher education: international and globalization. International research focuses on specific (international) issues within national higher education systems, whereas globalization research concentrates on world-wide trends and growing global issues or concerns. (Coryell *et al.* 2010.) International relations might involve just two nations while globalization involves many nations (Marginson 2010). Higher education internationalization can be described as the integration of an international/intercultural dimension into teaching, research and service of an institution (Knight & de Wit 1995, according to Coryell *et al.* 2010). Internationalization requires higher education to design opportunities which focus on skills needed to develop a global imagination (Rizvi 2001, according to Coryell *et al.* 2010).

2.1.1 Globalization of higher education

According to Held *et al.* (1999) globalization can be described shortly as

"…the widening, deepening and speeding up of worldwide interconnectedness."

Higher education institutions are both objectives of globalization as well as its agents (Scott 1998, according to Marginson 2010). The economic aspect of globalization and

the fact that global economic competition is seen as knowledge-driven, draw policy attention in to the higher education. But globalization is more than just economic trend; it is a symbiosis of economic and cultural changes that are dependent on each other. Communication systems, knowledge and culture are essential to world-wide market and economic competition launches new communication technologies, standardizations of knowledge and cultural forms that shape e.g. higher education. (Marginson 2010.) What is new about globalization this time are the processes of communication and information, where the economic and cultural aspects are joined. Inclusion and exclusion in relation to knowledge and ICT networks divide the global landscape (Castells 2000 and Giddens 2001 according to Marginson 2010).

Higher education is pivotal in cultural dimension of globalization and second level player in economic dimension. Moreover cultural sphere of higher education is more globalized than the economic sphere. Therefore it is surprising that the recent debate has focused on marketization, competition and management in higher education. More attention should be paid on cross-border externalities such as flow of information, ideas, knowledge and short-term people movement as well as negative "brain drain". (Marginson 2010.) Above all there is the Internet. Higher education is now unimaginable without the Internet that supports intellectual goods whose use value is higher than the cost of their distribution and consumption. The Internet allows world-wide databases and collaboration between academic faculties, which stimulates e.g. e-Learning. (OECD 2005, according to Marginson 2010.)

Globalization is a dynamic process that draws the local, national and global dimensions together. The process is not always predictable. Some theorists of globalization have argued that the nation-states are fading away. However, it seems that what is happening is opposite. The nation remains the major influence in the economy, day-to-day life as well as in higher education. In fact, it is impossible to success in global knowledge economy without a strong sense of national identity and strategy. Openness and engagement with others are also essential. To maximize strategic effectiveness in the global environment a higher education institution should consider both sides of this coupling equally important. (Marginson 2010.)

According to Marginson (2010), there are three kinds of potential global transformation in higher education. Transformations have varying implications for nation/education institution relations. 1) Global processes that national agents are not capable of modifying, such as development of Internet publishing and formation of global scientific labor market. 2) Global systems that engender a pattern of common changes in national higher education systems, such as use of English as the language of academic exchange. 3) Parallel reforms by the different national governments that facilitate inter-connectivity between higher education systems, such as Bologna process (below) in Europe.

The global higher education potential of individual nation and institutions within it is measured by the distribution of research capacity and the character of research. The United States plays a dominant role in world-wide higher education because of great

investments on higher education and the global role of English. European-level cooperation might have the potential to join the strengths of universities across the continent and already active student mobility is reshaping European industry and professions. (Marginson 2010.)

Europe is exceptional area in the global higher education landscape since there is multilateral negotiation between universities located in different countries. In other parts of the world international agencies play a relatively minor direct role in higher education. (Marginson 2010.) European Commission (EC) first became active in higher education policies in the mid 1970's. In the beginning its initiatives aimed at stimulating cooperation and mobility between "closed" national higher education systems. In the late 1980's deeper cooperation between European universities took place in the context of ERASMUS program, which was strongly linked on European integration process. In the late 1990's it was realized that the intra-European mobility was not enough and extra-European mobility needed to be enhanced. Two major political instruments shaping European response to globalization in higher education have been Bologna Process and Lisbon Strategy. (Wende 2009.)

The Bologna Declaration was signed in 1999 by 29 European countries. The first phase of the Bologna process concentrated on the harmonization of the degree structures within Europe. The second phase of the process has an aim to enhance international competitiveness and attractiveness of the Europe. It was declared in Lisboa in 2000 that the EU should become the most competitive and dynamic knowledge economy in the world by 2010. While the Bologna Process in seen to be associated with equal position of all the higher education institutions, Lisboa Strategy is seen to produce more hierarchical impressions on the European higher education landscape. It is crucial to find the right combination of competitive and cooperative options. (Wende 2009.)

According to Wende (2009) current trends in European higher education are both convergence, aiming for transparency and harmonization; and divergence, aiming for more diversity. While convergence enhances cross-border mobility within Europe and attracts students from other regions, divergence of education is needed to increase the higher education participation rates of the domestic students.

2.1.2 Internationalization of higher education

The purpose of this subchapter is to present driving forces of HEI internationalization as well as practices of HEI internationalization. Competition and market in higher education are now defined both at an international and national or local level (Marginson 2010). In other words basic social arrangements within and around the university become "disembedded" from their national context because of increasing flows of people, information and resources across the borders (Beerkens 2004, according to Marginson 2010). Forms of disembedding include cross-border sources of funding that become interesting while national public funding is reduced (in some countries), cross-border teaching programs that are only limitedly controlled by

governmental powers and cross-border accreditation of the higher education institutions. (Marginson 2010.)

The cross-border teaching programs as a form of internationalization and disembedment from the nation state are especially interesting from e-Learning cooperation viewpoint. Marginson (2010) argues that governmental powers to regulate services performed abroad by their national institutions as well as services performed by foreign institutions at home are undeveloped or limited. This is partly because of inadequate regulatory reach and partly because the same institutions operate as public providers at home and as private entities abroad. This gap in regulation raises questions in terms of quality assurance, funding and recognition of qualifications. Other serious questions raised by disembedment regard the role of the partly disembedded institutions: Where are they accountable for their international services? Should the creation of global public goods be seen as a part of their public service duties? Who are their global stakeholders and how and why they should be accountable to the stakeholders? (Marginson 2010.)

Childress (2009) studied internationalization plans for higher education institutions in US. The findings of the study included five benefits and functions of internationalization plans: 1) roadmap for internationalization, 2) vehicle that stimulates the engagement of key stakeholders, 3) mechanism for explaining the meaning and goals of internationalization, 4) medium for interdisciplinary collaboration and 5) tool for fund-rising. Enabling factors for the development of internationalization plans that were listed in the study were support from top institutional leaders, a campus wide internationalization taskforce, external stimuli such as participation in internationalization programs and upcoming institutional accreditations. Hindering factors for the development of internationalization plan found at the study included decentralized organization, slow movement of institutional decision-making, advanced stage of internationalization, lack of presidential support for internationalization and detailed planning initiatives, key vacant positions and lack of funding. (Childress 2009.)

Coryell *et al.* (2010) argue that abroad studies and international experiences cannot be the sole, nor even main focuses of higher education internationalization. Alternative methods to internationalize the learning experiences at home are needed for those who cannot afford the financial cost or time to study abroad.

Recent case study concerning internationalization processes of four universities in UK and US (Coryell *et al.* 2010) compiled elements needed for future implementation of international education. In general, the findings of the study call for new systems of dialogue, information sharing, collective goal setting, and learning objective development across institutional units as well as international communities to be developed in ways that support the change needed in internationalizing universities today. In practice, the concept of internationalization needs to be commonly understood across the institution before it can be operationalized across academic programs and administrative functions. It is also necessary for IHEs to consider funding structures currently in use and evaluate whether they support internationalization.

Internationalization outputs – how it impacts on student learning and university development – need to be measured systematically. The article offers one method for HEI internationalization effort and outcome assessment. (Coryell *et al.* 2010.)

2.1.3 Virtual mobility in higher education

"Virtual mobility is a shorthand term for the process of accessing activities that traditionally require physical mobility, but which can now be undertaken without recourse to physical travel by the individual undertaking the activity. Thus, virtual mobility creates accessibility opportunities, both substituting for physical mobility and enabling access where previously there was an accessibility deficit." (Kenyon *et al.* 2002.)

Virtual mobility has existed for as long as technology has allowed people to communicate in ways other than face to face, e.g. to access goods by telephone and to participate in education in the home through the printed word. More recently the concept of virtual mobility has started to be used in the context of activities undertaken *via* the Internet. (Kenyon *et al.* 2002.) In this paper virtual mobility refers to higher education activities taking place in the Internet.

Within Finland the mobility of the graduate and post-graduate students is managed through the Flexible Study Rights Agreement JOO. Advantages of the JOO agreement include coherent coordination and management, which guarantee decisions to be made in accordance with the rules and allow student mobility monitoring. The major disadvantage of the agreement is the heaviness of the administration. (Finnish Virtual University 2006.)

In the European level there is well established ERASMUS program that supports physical student mobility. According to Bijnens *et al.* (2006) there has been an initiative to broaden the arrangements to cover also virtual mobility. Real Virtual Erasmus (REVE) project tried to prove European Commission that there is need for regulations regarding virtual mobility. In the project it was found that current virtual mobility activities are arrangements that are either established in the framework of networks and alliances of higher education institutions or as private arrangements between the teachers who decide to share a course. (REVE 2007.) For now virtual mobility has no official recognition and there are no regulations and official agreements foreseen for virtual ERASMUS. And this is the case within Finland. Presumably, it is even harder to make university level agreements overseas e.g. with Asian and American universities.

In the Plan for Internationalization (TUT 2011) goals regarding teaching in 2020 are listed: International and multicultural learning environment at the University; Students will learn the skills needed to succeed in a global environment and world-class foreign lecturers will visit TUT on a regular basis and vice versa; Visiting lecturers and joint courses enhance joint curriculum and degree programs with partner institutions; Student and staff mobility will be straightforward between partner universities and departments. In the plan (TUT 2011), practical actions to reach these goals are

presented, but they hardly include the aspect of e-Learning. International online courses are mentioned in the plan as one way of internationalization from home. However, any practices to establish online exchange studies such as agreement on the university level are not mentioned. According to Haka-Risku (2011), Head of International Office, TUT, there are no established practices for virtual exchange in TUT and university units manage it in diverse manners. Often the international unit of the university does not receive information about ongoing virtual exchange.

2.2   e-Learning in higher education

Research on e-Learning is still in a nascent stage and there is significant conceptual confusion in the field (Davidson & Waddington 2010). According to Sun *et al.* (2008) e-Learning is defined as

"…the use of telecommunication technology to deliver information for education and training."

In the field of e-Learning research, blended learning is the key word. The goal of blended learning is to join the best features of online learning with the best features of class room teaching to promote active, self-directed learning opportunities for students (Garnham & Kaleta, 2002, according to Vaughan 2010).

2.2.1   Role of e-Learning in higher education

Since the mid-1990's e-learning has been expected to play an important role on the large-scale transformation of higher education in Europe. Higher education has been expected to become more inclusive, international and flexible. Despite large public investments on computer technology and networking infrastructure, neither expected virtualization of the universities nor knowledge centre networking has not really happened. However, virtual mobility is currently starting to be seen as a potential component of the Bologna process. (Szucs 2009.)

Higher education institutes resist the adaptation of new technologies referring to lack of administrative support, technological competence and time as well as questions about intellectual property. However, the forces behind e-Learning are so powerful that the question to be asked is not *whether* idea of e-Learning should be supported, but rather *how* e-Learning can best be integrated in the higher education. (Davidson & Waddington 2010.) Already 14 years ago, when the Internet first entered into university teaching, Hatfield (1997) argued that electronic classrooms cannot be ignored by the university teachers and it should be discussed *how* the Internet can be best adapted into the needs of university teaching. Back in that time, the possibilities of the Internet as an educational tool were seen to be facilitated instructors' responsiveness to student needs, increased professional linkages of students, professionals and faculties and provision of increased access to the educational materials (Hatfield 1997). Academic debate today is

analogical to that one from mid 1990's. Researchers are still trying to find out how learning can be best supported by todays' e- Learning tools.

"Developing new study environments in higher education could be easy and simple in practice, but blended in terms of studying and learning." (Portimojärvi & Rantala 2010.)

When creating new learning environments three elements should be considered and developed in parallel: course content, study practices and learning tools (Portimojärvi & Rantala 2010).

2.2.2 Learning theory of e-Learning

There is always a critical shortage of resources that forces us to maximize the efficiency of teaching methods. Theories of e-Learning can help with this optimization. In general, adults learn the same way in online context than in other learning contexts and therefore general learning theories can be adapted to online learning. Current theories of learning argue that effective learning is learner, knowledge, assessment and community centered. Online environment makes certain limitation to the learning methods and simultaneously it offers new learning methods to be utilized. (Anderson 2004.)

In learner centered learning teachers are aware of students' preconceptions and cultural perspectives that they bring to the learning context. In an online learning context the teachers are less able to interact transparently with students and e.g. interpret body language. On the other hand online learning environment offers tools for communication that can actually enhance introducing of the learning community members. Online communication tools are also used by students in their everyday life and the communication norms and tools used in informal virtual environments are not necessarily appropriate to an educational online context. (Anderson 2004.)

The idea of knowledge centered learning is that the each field of science has its unique knowledge structures and students need opportunities to experience this discourse as well as reflect upon their own thinking. The Internet has overwhelming provision of knowledge resources and teachers need to provide the big picture to the students so that they know what is relevant and have a base on which they can grow their own knowledge and discipline-centered discoveries. (Anderson 2004.)

Online learning environment offers many possibilities for assessment. Anderson (2004) has listed assessments that involve the teacher, assessments that exploit the expertise of peers, assessments that use computer algorithms to assess student production and most importantly those that encourage learners to assess their own learning reflectively. Ideally cognitive processes as well as end results are assessed. If online students work besides their studies, assessment activities can be project and work place based. A danger in assessment-centered online learning environment is increased workload of the teachers. Strategies for formative and summative assessments with minimal direct impact on teacher workload are urgently needed. Tools minimizing

teachers work while keeping assessment quality high include virtual labs, collaborative learning environments that students create to document and assess their own learning and student agents who informally facilitate and monitor peer activities. (Anderson 2004.) Other tools listed by Anderson (2004) have not become into wide use in the universities or at least not in TUT. Those visions included online automated tutors and neural networks that machine score complicated materials such as student essays. More recent online tools are discussed later in this chapter.

Community centered learning adds a critical social component to the learning process (Anderson 2004). Online learning community participants have shared sense of belonging, trust, expectation of learning and commitment to participate as well as to contribute to the community (Wilson 2001, according to Anderson 2004). It is more difficult than one might think to create and sustain these communities and lack of shared location and synchronicity may be more fundamental hinders than the absence of body language and social presence. It is often thought that the major motivation for enrollment in distance education is physical access, but in fact it is rather the temporal freedom that attracts students. Participation on online community is contradictory to the freedom even when asynchronous communication tools are used. If the learning environment is aimed to be learner centered, also this contradiction should be considered and flexible learning environments that accommodate the diverse needs of students and teachers at different stages of their life cycles are needed. (Anderson 2004.)

Lindfors (2010) also addresses a significance of learning community. In her view, there is need for tutoring on online courses and tutoring is especially important if the participants have little experience of learning community work. Tutor should offer help for the students even if it is not specifically requested. Tutoring can be done by scripts i.e. instructions and comments on how to proceed. Scripts can act as informative, encouraging and supportive messages from the tutor. Tutoring and scripts can also teach students e-Learning culture. Without tutoring and scripts it is unlikely that students can form a successful learning community. Alongside tutoring, Lindfors (2010) mentions pedagogically meaningful use of ICT, learning task and collaboration as essential components of creating learning community. Creating and managing meaningful learning environments requires much more work than traditional courses with lectures, literature and exam (Portimojärvi & Rantala 2010).

Online courses have a potential for international and multicultural learning communities. Cultural diversity should be considered when creating successful learning environments. Tapanes *et al.* (2009) have studied how cultural backgrounds of online course students relate to their perceptions of culture in the online classroom. Cultural dimensions taken into account were individualist/collectivist dimension and ambiguity (in)tolerance or uncertainty avoidance. Supposed cultural dimensions of some countries are presented in the Figure 2.1. The online courses under research were organized in USA and therefore taught from an individualist and ambiguity tolerant perspective. (Tapanes *et al.* 2009.)
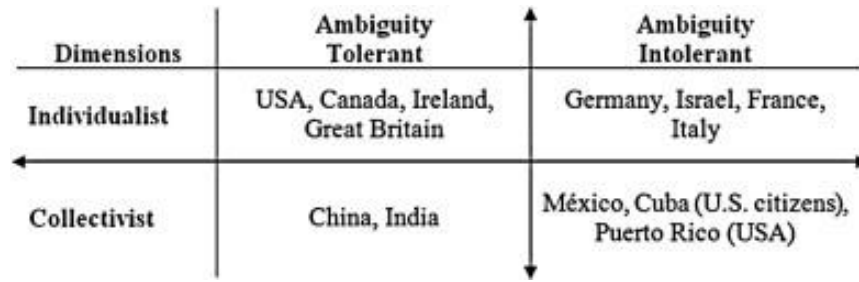
Dimensions	Ambiguity Tolerant	Ambiguity Intolerant
Individualist	USA, Canada, Ireland, Great Britain	Germany, Israel, France, Italy
Collectivist	China, India	México, Cuba (U.S. citizens), Puerto Rico (USA)

Figure 2.1. Participants' birth nationalities and quadrant classification (Tapanes et al. 2009)

Individualist students reported positive cultural awareness from their instructors while students from collectivist cultures viewed their instructors as unaware of cultural differences in the classroom. Minority learners also gave more importance to cultural consideration as well as importance of being informed about cultural differences than their peers from the majority culture. Minority students felt less motivated to participate partly due to their cultural backgrounds and partly because of language (troubles). One way to overcome negative feelings of being outside, is to give students advice on what they will see and experience during the course as well as instructions about participation. (Tapanes *et al.* 2009.)

Also Anderson (2004) highlights the need for enhanced communication within the learning community in the beginning of the course. Formation of the learning community can be facilitated by providing the students an opportunity to share their understanding, their culture and unique aspect of themselves.

2.2.3 e-Learning tools

In their technocratic paper Davidson & Waddington (2010) have questioned the tools that are used for e-Learning in the universities and also the way the tools are used.

"One does not have to be a researcher to understand that a significant proportion of the population with access to digital technologies no longer learns in a traditional fashion." (Davidson & Waddington 2010.)

It is argued that the traditional model of professor lecturing and student taking notes and memorizing them for the exam no longer works. Neither is it sufficient to use less-than-ideal virtual learning environments, such as Moodle, carelessly. New generation is demanding that new ways of learning through technologies such as blogs, social networks and wikis continues in the classroom.

According to Davidson & Waddington (2010) students use tools such as Skype, MSN and Facebook in their everyday life in terms of both work and play. For today's students e-Learning tools widely used at the universities, such as Moodle and Adobe

Connect, are inaccessible in a sense of being robust and in contrast with the flexible technology used for communication and collaboration in everyday life. Not only e-Learning tools are unpleasant, but also their usage is unthougthful. Certain uses of educational technology (e.g. the online quizzes popular in Moodle and forced interaction in discussion forums) can create monochrome educational environments. Careless use of educational technologies can actually reduce the quality of students' educational experience. Links between the technology and pedagogy should be carefully thought when designing learning activities. (Davidson & Waddington 2010.)

Davidson & Waddington (2010) have made recommendations for e-Learning in the university setting. Firstly, it is difficult to create communities of practice in virtual learning environments. Whenever possible, meeting in person would assist in creating the learning community that works together towards a common goal. Secondly, technologies should have other purpose in learning than just the fact that technology usage is innovative or it is made available by the institution. Thirdly, online communities need to be created and maintained with continual effort. Fourthly, when designing activities, it is essential to think up interesting tasks that present high-level challenges. Number five recommendation is creating captivating simulations. The final recommendation is to reduce the gap between educational institutions and everyday life in terms of technologies used.

2.3 Student feedback as a tool for quality assurance and enhancement

HEIs are facing increased expectations for quality and to meet these expectations, various methods and tools such as ICTs, international and interdisciplinary cooperation and establishment of evaluation and accreditation mechanisms are used. In addition, new participatory management styles are applied and students are seen as active partners in higher education governance. (Gül *et al.* 2010.)

Number of e-Learning courses in universities is growing and the assurance and enhancement of them has increasingly become a concern for higher education practitioners and managers (Jara & Mellar 2010). Jara & Mellar (2010) have studied the collection of student feedback in higher education e-Learning courses and the use of this feedback for quality assurance and enhancement. In the four case studies they found out that the implementation of module evaluations was often unsuccessful, which led to low response rates and poor quality feedback, and that there was a lack of clear strategies for collecting and processing results. The main challenge for the e-Learning course staff was seen to be obtaining enough relevant feedback to make the data useful for quality assurance and enhancement. Also improvements in data collection and processing strategies were needed, since in some cases even when there was data gathered, it was left untouched or only superficially analyzed.

Jara & Mellar (2010) argue that e-Leaning course teams need to consider the issues identified in the study if they want to improve the effectiveness of their student

feedback strategies. Namely course teams need to address the quantity and quality of the student feedback as well as to ensure that the data collected is analyzed and acted upon. Improved mechanisms for obtaining feedback need to be examined. Instead of formal surveys at the end of modules more qualitative and dialogic methods should be developed to collect feedback useful for enhancement purposes (Harvey 2003, according to Jara & Mellar 2010). Evaluation tasks can be embedded as part of online course assignments to encourage students to reflect their own learning and think whether the e-Learning tools/materials have supported them in that process. In online interaction tutors usually establish close relationships with their students, which could be explored further as a mean of gathering feedback. These types of feedback gathering allow course team to identify difficulties and respond them while the course is still in progress. Finally, to guarantee the use of data collected, course leaders need to explicitly assign responsibilities for quality assurance. (Jara & Mellar 2010.)

Sun *et al.* (2008) studied the critical factors influencing learner satisfaction in e-Learning. They found that the course content is the most important concern in the e-Learning environment. Other factors affecting learner satisfaction are: technical design which affects usefulness and ease of use of a course, diversity in assignments, e-Learning course flexibility and attitudes – learner computer anxiety and instructors' attitudes toward e-Learning. When implementing successful e-Learning environment these factors should be taken into consideration.

3 MATERIALS AND METHODS

3.1 Online course Safe and Sustainable Sanitation

3.1.1 Course description

Safe and Sustainable Sanitation (SSS) is an online course based on lectures given by international experts during the pre-conference workshop of the latest International Dry Toilet (DT) Conference. So far, the conference has been realized three times, in autumns 2003, 2006 and 2009. The web course was put together for the first time in 2006 (version 1). The version 1 was offered to university students for three times (autumns 2006, 2007 and 2008) until the course was renewed in 2009 (version 2). The version 2 has been realized twice so far (autumns 2009 and 2010).

The aim of the course is to familiarize the participants to the different methods on urine and excreta reuse, the evaluation, selection and implementation of techniques and risk control actions related to the reuse. The course gives the students the basic skills of interactive exchange of information and options among individuals, groups, and institutions regarding most common sustainable sanitation techniques and the risks and risk management techniques related. Themes covered are safety, technical feasibility, socio-economic aspects and ecological sustainability of alternative, non-traditional sanitation. The following aspects are included: developing vs. developed countries, south vs. north, dry vs. humid climates, rich vs. poor areas, women vs. men.

The course is worth 3 ECTS credit points, which equals to a total workload of 81 hours. The course is divided into 7-8 sections each lasting for 1-2 weeks. The sections consist of a video lecture and/or reading material and a learning assignment. Course grading is based on the assignments that include 2 group works, peer reviews of the other students' work, individually written assignment, quizzes and participation in asynchronous discussions on the course topics. Fertilizer plan assignment was included in the version 1, but was removed from the version 2. Course programs are found in Appendix 1 (version 1) and Appendix 2 (version 2).

3.1.2 e-Learning tools used on the course

The course version 1 was using A&O learning environment. The A&O (Avoin oppimisympäristö - Open learning environment) development was coordinated by TUT Hypermedia Laboratory (Hautakangas & Pohjolainen 2003) and it was widely used in TUT in 2000's. However, in 2009 A&O was getting to the end of its lifecycle and TUT course providers had started to switch to Moodle, which is an open source virtual learning environment that is widely used by educators around the world (Moodle 2011).

This change in learning environment didn't have a major impact on the course interface or activities. Moodle offers more features than A&O, but in SSS only few activities needed for sharing learning materials and realizing assignments have been used. The Moodle activities in use include quizzes with multiple choice questions, discussion forums to comment topics and form groups, database to submit assignments and comment them, wiki to form groups and choose group work topics, chat to form groups and uploading files to hand in written assignment.

In version 1 lectures were offered in two formats: 1) video lectures including lecture slides, video of a lecture and lecturers voice and 2) lecture slides. Version 1 video lectures used .smi file extension, which is an audiovisual presentation created using the Synchronized Multimedia Integration Language (SMIL) (Downloadatoz 2011). These video lectures could be opened with Real Player or similar software. Real Player was freely available in the Internet. In version 2 video lectures were in Flash Video Format. The advantage of Flash Video Format is that it is very commonly used and it is installed in 95 % of the web browsers (Mediacollege 2011). In addition to the "movies" and plain slides, the third lecture format - video lecture including slides and voice, but not picture - was added to the version 2. Lecture slides and reading materials were offered in pdf format in both course versions and they required Adobe Acrobat Reader or similar software to open. The software needed was freely available in the Internet.

3.1.3 Course participants

The course is aimed at advanced M.Sc. students, Ph.D. students and postdoctoral students from Finnish and international universities as well as sanitation professionals with a university degree. All together 218 students have taken the course: 36 students in 2006, 42 in 2007, 39 in 2008, 63 in 2009 and 38 in 2010. The number of participants in 2009 is large due to the DT 2009 conference. Some of the conference quests took part on the course and conference increased sanitation awareness among potential students and offered a channel to market the course. In the last conference year, 2006, similar attraction of the participants did not emerge. Back in 2006, the DT conference was smaller and the online course was new, which can explain the moderate number of participants.

In Figure 3.1 countries of origin of the students are presented. Students from 37 different countries have taken the course. Half of the students have come from abroad. ERASMUS students from European countries have taken the course frequently. Also several Indians as well as Nepalese, who study in the International Master's Degree Programmes of TUT, have taken the course. In addition there has been occasional visitors from all over the world.
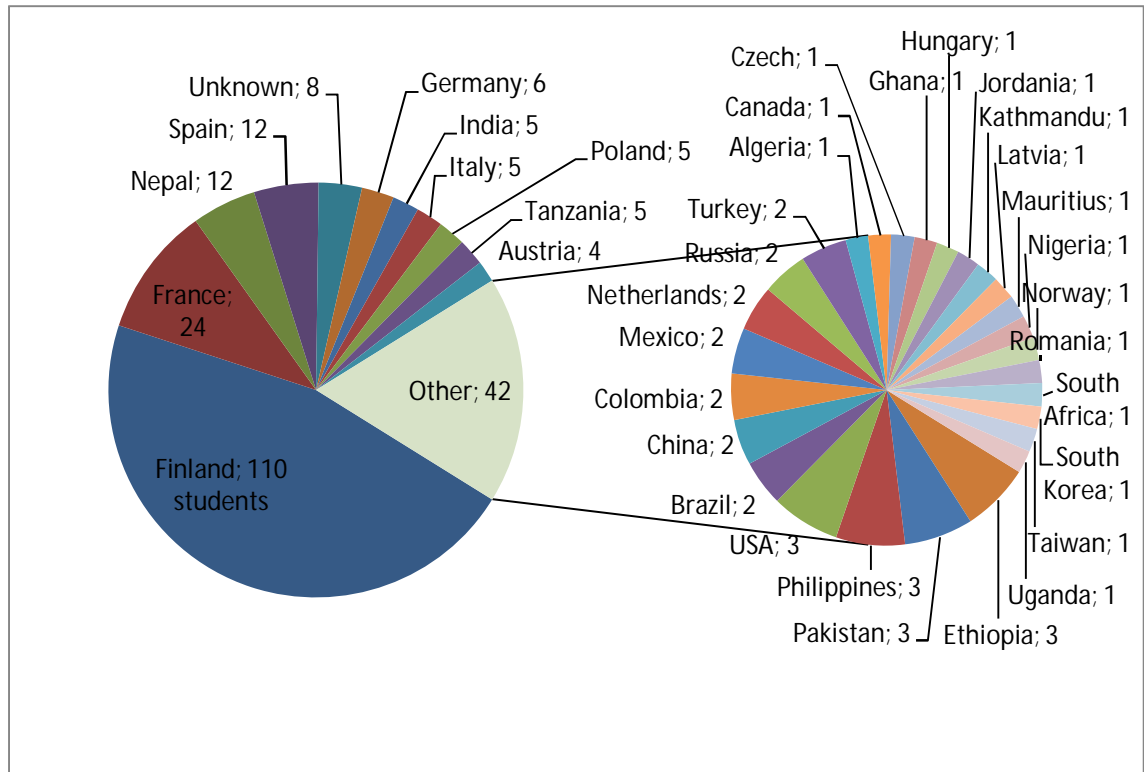
Figure 3.1. *Countries of origin of the students (2006-2010)*

In Figure 3.2 students' educational backgrounds are presented. The data was only available for feedback questionnaire respondents, not to all the students. *UNI FIN* students are mostly advanced master students from TUT. A few master students have come from other Finnish universities such as University of Tampere or University of Helsinki. Students of the International Master's Degree Programmes of TUT are included into the group *UNI FIN* even if their country of origin was not Finland. *Poly* students are environmental engineering students from Tampere University of Applied Sciences (TAMK). They are students of Eeva-Liisa Viskari (Head of Degree Program), who is one of the SSS course lecturers. About half of *Poly* students come from abroad. Exchange (*EXT)* students have usually come to TUT within the ERASMUS program. None of the exchange students have done just virtual exchange studies, they have all moved to Finland for a semester or two. *PhD* students are from all over the world. They come from the Finnish universities and especially from The Finnish Doctoral Program in Environmental Science and Technology (EnSTe). Some of the PhD students are DT conference (and workshop) participants, who come mostly, but not only, from developing countries. The rest of the PhD students are from the universities to which the course organizer has personal contacts. Either the course organizer has invited the students to join the course or they have heard about the course and have asked to participate. *Pro*fessionals are DT conference (and workshop) participants or staff of the International Red Cross. Professionals work mostly in sanitation projects in developing countries. Abbreviations in italic are used in figures in the Chapter 4. The visiting students, except ERASMUS students, have been taken to the course unofficially. Their

credit points have not been registered in TUT, but they have received a certificate that e.g. allows them to apply for the credit points at their home institution.
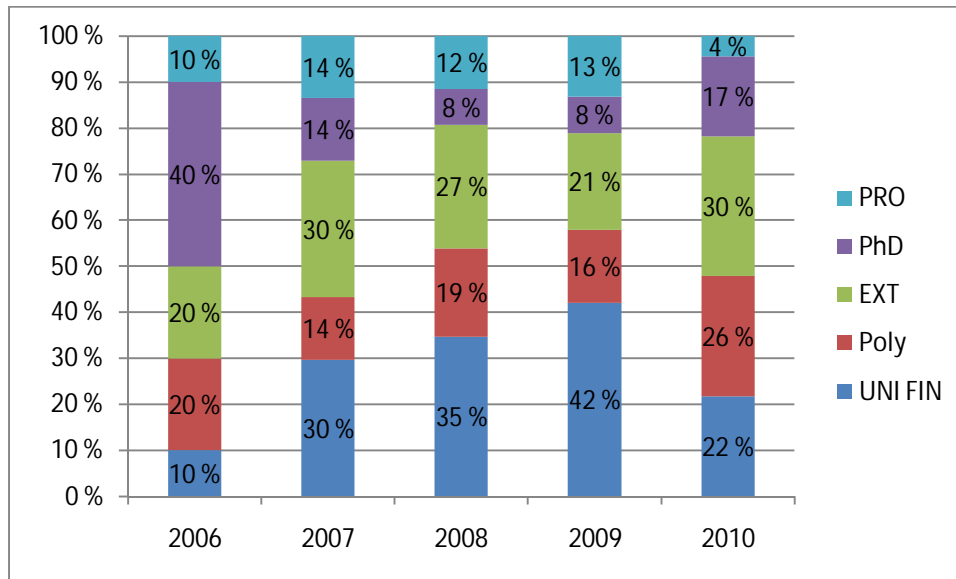

Figure 3.2. *Educational backgrounds of the students (2006-2010)*

3.1.4 Course staff

The pre-conference workshop as well as the online course are coordinated by Professor Tuula Tuhkanen (the Environmental Engineering and Biotechnology Laboratory, TUT). She has been in charge of inviting lecturers to the workshop and the online course. Later in the study "the course organizer" refers to the Environmental Engineering and Biotechnology Laboratory and especially professor Tuhkanen. The professor also evaluates most of the student assignments on the course and gives feedback to the students. An assistant of the professor has done part of the evaluation and also given feedback to the students. These activities are referred as teaching in next chapters. Professor Tuhkanen and the assistant form a course staff that is discussed later on in the study. Term tutoring refers to helping students with instructions, reminders, messages etc. before, during and after the course. The assistant has been in charge of tutoring.

Lecturers' role has been to give their lectures and possibly give ideas for assignment. They have not participated on teaching during the course. The lecturers have signed the contract of usage rights that allows the Environmental Engineering and Biotechnology Laboratory (TUT) to use the materials on the online course for three years. They have been only paid a small lecturer's fee for 2 hour lecture and the course organizer has committed not to use the material for commercial purposes. Lectures have been recorded by a professional from the TUT e-Teaching support. The learning environment has been designed and managed by the course assistant. The e-Teaching

support has registered the visiting students to the course and helped the assistant with technical problems.

3.2 Student feedback collection

After each course realization, student feedback was collected with an online questionnaire that was placed in the virtual learning environment as a voluntary assignment of the last week. Version 1 questionnaire is in Appendix 3 and version 2 questionnaire is in Appendix 4. Both questionnaires include structured multiple choice questions and open questions. The version 2 questionnaire is more detailed that the version 1 questionnaire. Also answer choices have been modified. Version 1 structured questions are answered in the scale *excellent, very good, good, fair, poor, no opinion* while version 2 scale is *excellent, good, not so good, bad*. Version 1 structured questions were obligatory, but the students could choose "no opinion", while in version 2 none of the questions were obligatory. Version 2 scales made interpretation more clear. For example, it was hard to tell the difference between *excellent* and *very good* while *excellent* and *good* were more easily distinguishable. Because of questionnaire modifications, the data was not fully comparable.

All together 154 students out of 218 have given feedback. This makes the total response rate 71%. Numbers of students and respondents as well as the response rates for each year are presented in Table 3.1. Nearly all the respondents answered to all the structured questions even in version 2 when it was not obligatory, and most of the respondents answered also to the open questions. Response rates are rather high, which can be due to feedback collection form that is similar to the quiz assignments used at the course. Students are familiar with the format and it is easy to give feedback.

Table 3.1. Number of students on the course, respondents and response rates

Year	2006	2007	2008	2009	2010	Total
Course participants	36	42	39	63	38	218
Respondents	26	37	27	39	25	154
Response rate	72%	88%	69%	62%	66%	71%

According to Rautio (2007) the questionnaire is a good method of collecting responses if the problem is well defined and it will not be modified during the project. The range of possible answers needs to be known in advance and additional clarifying questions can not be asked. Questionnaire is also useful when there are questions that some respondents might prefer to answer anonymously. (Rautio 2007.) The questionnaire used in this study was designed to measure how satisfied students were with different parts of the course (structured questions) and to find out what students like the most, what they dislike and what kind of improvement ideas they have (open questions). The questionnaire was designed prior to this study, which constricts the study. This

questionnaire did not have an advantage of anonymous answering. The course staff could identify the respondents, which might had an affect on responses.

In addition to the questionnaire, some data was collected using participative methods. Or "virtual participative methods" since normally the term is used to describe methods where a researcher is physically involved in a development project. The researcher had been involved with the course in several roles: a student in 2006, a workshop organizer in 2009, a tutor and a teacher in 2010 and a developer of the version 3 (2011). This study has been in process since 2009. Participation has allowed data collection from student assignments, e-mails and problem solving situations. According to Rautio (2007) participative methods are used in normative projects that aim at finding out not only how things are, but above all how they should be. In normative approach target should initially be defined, but not too precisely. (Rautio 2007.) At the outset questionnaire that require clear hypothesis and normative approach with loosely defined target seem contrary. In this study the role of structured questions was to describe the current stage of the course and participative methods aimed at describing how the course should be developed. Open feedback partly described the current stage and partly gave ideas to the course development.

3.3 Analysis methods

3.3.1 Comparison of methods

The material is analyzed using both, qualitative and quantitative methods of social sciences. Relationship of qualitative and quantitative methods in this research can be described as follows. Qualitative method is used to find and describe exceptions in the data. In the quantitative analysis a general student satisfaction can be described, but exceptions are lost in the mass of data. However, the exceptions might be critically important in course quality enhancement. According to Saaranen-Kauppinen & Puusniekka (2006) a clear distinction of quantitative and qualitative research is difficult since most research in social sciences includes both elements.

3.3.2 Quantitative methods

Answers to the structured questions of the questionnaire were analyzed using simple quantitative methods: tabulation and graphics. According to Routio (2007) these methods are suitable for presenting data and roughly its structure. Cross tabulation is a powerful tool in searching for invariant structures in the data (Routio 2007) and it was used to describe variation of answers in different student groups (*UNI Fin, poly, ERASMUS, PhD* and *Pro*). Percentage distributions were used to describe overall student satisfaction, to describe and compare satisfaction to different components of the course and to observe changes in student satisfaction over the five year period. In more advanced statistical analysis the strength of association between two variables could

have been measured by using correlation analysis (Routio 2007), but this was not done in this study.

Since Moodle quiz used for feedback collection is originally an assignment tool, the item analyze performed by Moodle offers data suitable for analyzing and judging the performance of each question for the function of assessment (Moodle help 1). These statistical parameters are not useful for student feedback analysis. Moodle quiz tool processed the feedback data offering e.g. number and percentage of students choosing each alternative (e.g. *excellent, good, not so good, bad*) for each question. Statistical analysis offered by Moodle was misleading in the cases when students open the questionnaire but never fill it. These students were counted into total number of respondents, which was used to calculate percentages of students choosing each question. In A&O either number of students sending the questionnaire was counted or students didn't preview the questionnaire during the course history. In any case it was chosen to use the number of completed and sent questionnaires as a number of respondents and therefore the results were not exactly same than those available in Moodle. In short, answer percentages to each question given by Moodle did not add up to 100% while the results of this study did, unless rounding effected to one direction or another. For statistical analyses Microsoft Excel 2010 spreadsheet application was used.

3.3.3 Qualitative methods

Open feedback was analyzed using qualitative methods, which form a wide and overlapping set of analyze tools. The method of this study could be called exploratory classification with a normative point of view. According to Routio (2007) the goal in classification is to reveal the systematic structure that exists in all the cases of the study. In this study the classification was done for the answers to the open questions *What was good?* and *What was bad?*. The answers were carefully studied starting from the first question (*What was good?*) and the first year (2006). Different issues that students mentioned were marked and it was counted how many times the issues were repeated. One student could have mentioned one or more issues. Then the text was red through again trying to discover connections between different issues and decide if these issues could be connected without losing information. For example whether it would be enough to sum all comments regarding assignments or should group work, quiz, discussion and essay be separated or should even two different group works be separated. According to Alasuutari (1993) good analyzes compresses data, but does not lose meaningful information. The process was repeated to all five years, and answers to the second question (*What was bad?)* were handled in the same way. Results of the classification are presented in the next chapter in the form of tables and graphs. It is necessary to be careful when reading this kind of table where qualitative data is presented in a quantitative form. Some part of the variation is due to the classification process and small differences in percentages should therefore be ignored.

The classification was exploratory, because it did not rely on existing theories. According to Routio (2007) a researcher normally starts by first studying literature on

the topic, but if this leaves him without suitable theoretical classification, he can try to find the structure from the material itself. One possible reason to rely on the material instead of theory is that the object of study differs from all earlier studied objects. The goal of that kind of study is to describe its exceptional character which previous theories have been unable to portray. (Routio 2007.) In this study a list of factors affecting student satisfaction was found from the literature, but it did not fully match with the data of this study. Therefore, the classification was based on the student feedback, not literature. Surely the literature affected the findings, formation of classes and their further analysis. However, the basic idea was to let the students tell what was good and what should be changed.

Normative research aims to point out in which respects the object of study can be improved and usually the project includes planning an approach for carrying out the necessary improvements (Routio 2007). The aim of this study is to improve the SSS online course and in the Chapter 6 recommendations for course development are presented. Recommendations are taken directly from development ideas given by students in open feedback. Indirectly recommendations are constructed from hints given by students in the whole questionnaire. For example, if some part of the course was evaluated harder than other parts, it was determined that this part needs to be considered when developing the course. Similarly the data collected in participatory research approach was studied critically in order to find the course weaknesses and improvement ideas. In discussion of the results, previous literature was consulted to find best practices for e-Course implementation.

4 RESULTS

In this chapter the survey results are presented. Answers to the structured questions are presented in two forms. Firstly, the answers are presented separately for each year and secondly, the cross tabulations illustrating the answers in each student group are presented. Answers to the open questions are classified under headlines, which figure frequently in the feedback. Results of the two first questions – *likes* and *dislikes* – are presented in both qualitative and quantified form while the results of the last question – *development ideas* – are presented only in the qualitative form.

4.1 Structured questions

4.1.1 General opinions of the course

During the version 1 the students answered to the question *In general, the course has been*. Comparable question asked during the version 2 was *I would grade this course as*. All the respondents answered to this question. Answer choices to the first question were given in verbal form and to the second question as university grades. Answers were very positive. Yearly results are presented in Figure 4.1. During the course history both course versions have been evaluated *fair* by one respondent. Most of the respondents considered the course to be *very good* and proportion of the students choosing this answer has stayed stable over the years. When the course was updated in 2009, the proportion of the students highly satisfied with the course - answer *excellent (5)* - increased and accordingly the proportion of the students slightly satisfied - answer *good (3)* - decreased.
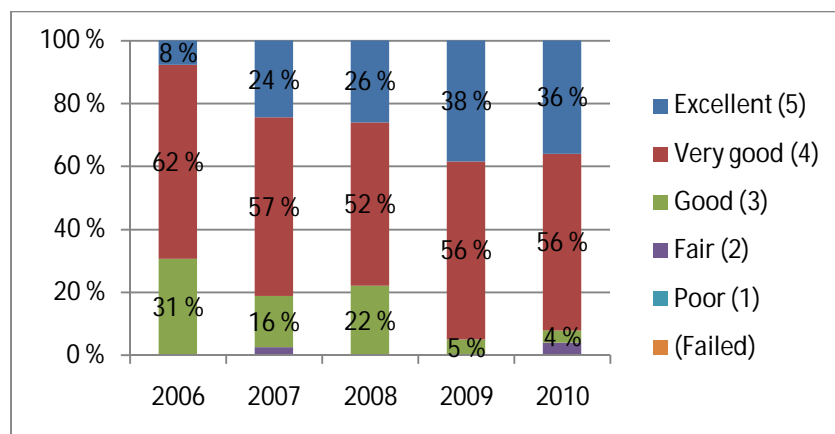

Figure 4.1. *Evaluation of the course in general from 2006 to 2010*

When student satisfaction in different student groups is examined (Figure 4.2), small differences are found. All but one of the professionals evaluated the course *excellent (5)* or *very good (4)* and professionals is therefore the most content group. The least content group is exchange students, who have evaluated the course *excellent* more seldom than the other students.
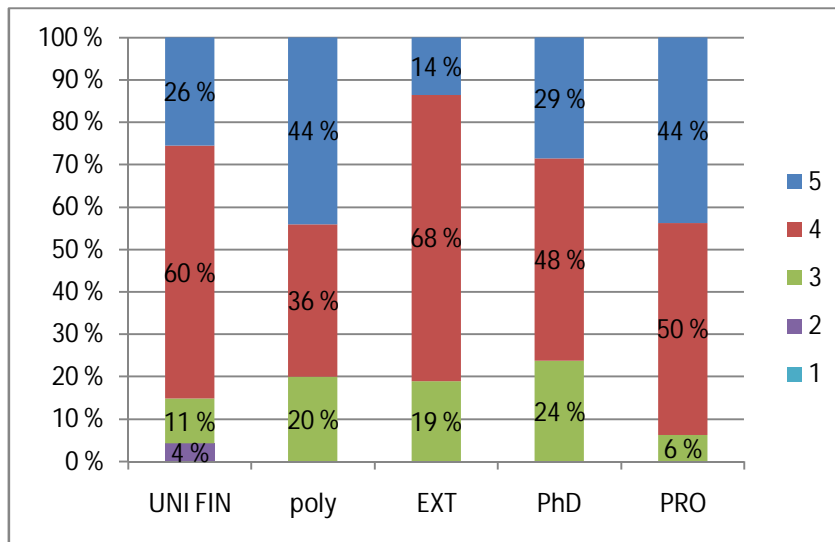
Figure 4.2. *Evaluation of the course in general in different student groups (2006-2010 together)*

During the second course implementation more detailed questions were asked. Yearly results to the question *The course structure was* are presented in Table 4.1. All the respondents answered to this question. About half of the students have evaluated the structure *good* and another half has evaluated it *excellent*. The satisfaction has slightly decreased from 2009 to 2010.

Table 4.1. *Evaluation of the course structure*

Course structure	Year 2009	2010
Excellent	49%	36%
Good	49%	60%
Not so good	3%	4%
Bad	0%	0%

When satisfaction with the course structure is examined in the different student groups (Figure 4.3), significant differences in proportions of students evaluating the structure *excellent* are found. The professionals are the most content again as well as the exchange students are the least content. However, those evaluating the structure most critically and choosing *not so good* belong to the groups Finnish university students (*UNI FIN*) and students of the Tampere University of Applied Sciences (*poly*).
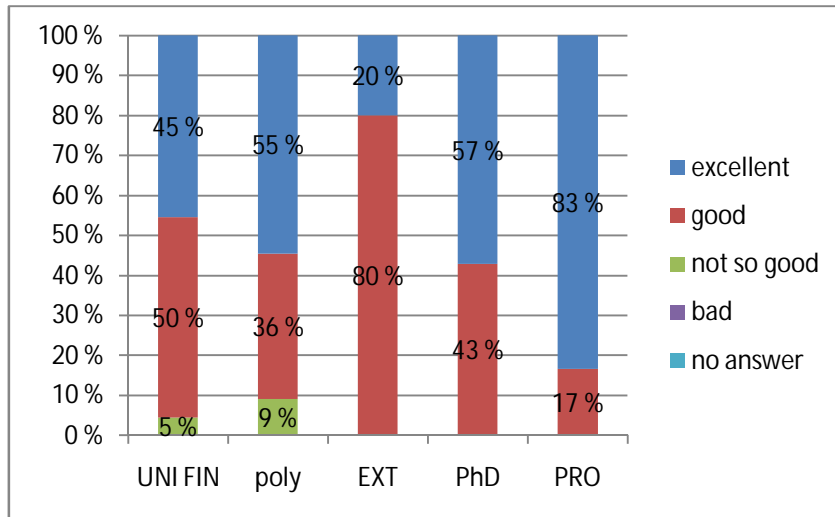
Figure 4.3. *Evaluation of the course structure in different student groups (2009-2010 together)*

The workload was considered *a bit too high* by the majority of the students as presented in Table 4.2. One student both years evaluated workload *too high* while the rest of the students evaluated it *a bit too low*. Proportion of the students feeling that there was a bit too much work decreased from 2009 to 2010 and proportion of the students feeling that there was a bit too little work increased, respectively.

Table 4.2. *Evaluation of the workload*

Workload	Year 2009	2010
Too high	3%	4%
A bit too high	77%	60%
A bit too low	15%	36%
Too low	0%	0%
No answer	5%	0%

Bachelor and Master students of the universities in Finland and abroad evaluated the workload *a bit too low* more often than the other student as presented in the Figure 4.4.
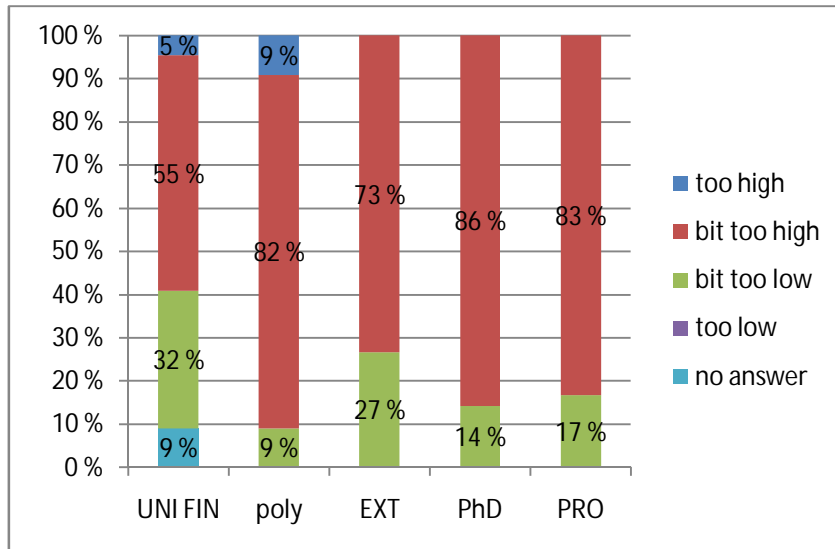
Figure 4.4. Evaluation of the workload in different student groups (2009-2010 together)

The respondents evaluated the deadlines as presented in Table 4.3. The answers are distributed similar to those of the previous question. The most of the students considered deadlines *a bit too tight* and one student *too tight*, while rest of the students considered them *a bit too slack*. In 2009, vast majority of the students considered deadlines tight while in 2010 answers were distributed more evenly between *a bit too tight* and *a bit too slack*.

Table 4.3. Evaluation of the deadlines

Deadlines	Year 2009	2010
Too tight	5%	0%
A bit too tight	77%	56%
A bit too slack	13%	40%
Too slack	0%	0%
No answer	5%	4%

Two findings can be highlighted from Figure 4.5. Firstly *poly* students have evaluated the deadlines tight more often than the other students and secondly several students in the group of the Finnish university students have not answered the question.
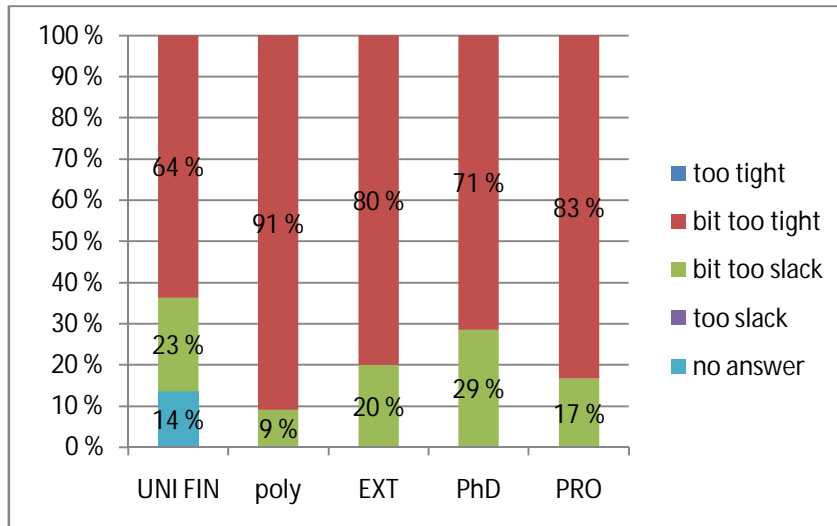
Figure 4.5. *Evaluation of the deadlines in different student groups (2009-2010)*

As one student mentioned in open feedback, there was one important answer choice missing from the two previous questions related to workload and deadlines.

"*The questions 8 and 9 of this feedback should contain also the options not too heavy or too light or tight/slack. At least I feel that the course was quite optimal in workload and deadlines.*"

Since the students had to choose between *a bit too high/tight* and *a bit too low/slack*, it is impossible to determine how many students actually considered workload and/or deadlines fair.

The next two questions measure tutoring. The first of them is *The course instructions were*. One student found the instructions *not so good* in 2009 while other students' answers distributed evenly between *excellent* and *good* (Table 4.4).

Table 4.4. *Evaluation of the course instructions*

Course instructions	Year 2009	2010
Excellent	49%	44%
Good	49%	48%
Not so good	3%	0%
Bad	0%	0%
No answer	0%	8%

The professionals found the course instructions *excellent* more often than the other students while the exchange students found them *excellent* more seldom than the other students. Students of the University of Applied Sciences had more distributed opinions than the other groups (Figure 4.6).
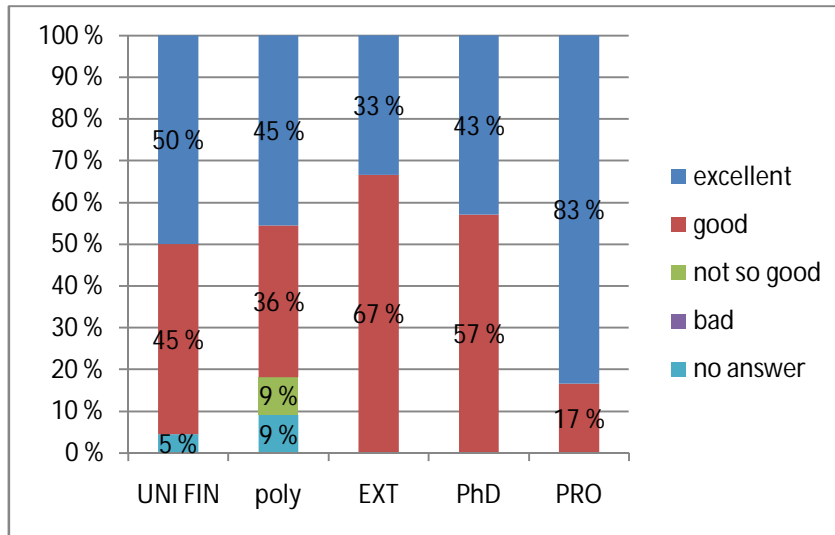
Figure 4.6. Evaluation of the course instructions in student groups (2009-2010)

The second question measuring tutoring is *The course staff was*. Half of the students found the course staff *excellent* and half of the students found the staff *good* (Table 4.5).

Table 4.5. Evaluation of the course staff

Course staff	Year 2009	2010
Excellent	49%	52%
Good	51%	44%
Not so good	0%	0%
Bad	0%	0%
No answer	0%	4%

PhD students were the most content with the course staff followed by the Finnish university students and professionals. The least content with the staff were exchange students followed by *poly* students (Figure 4.7).
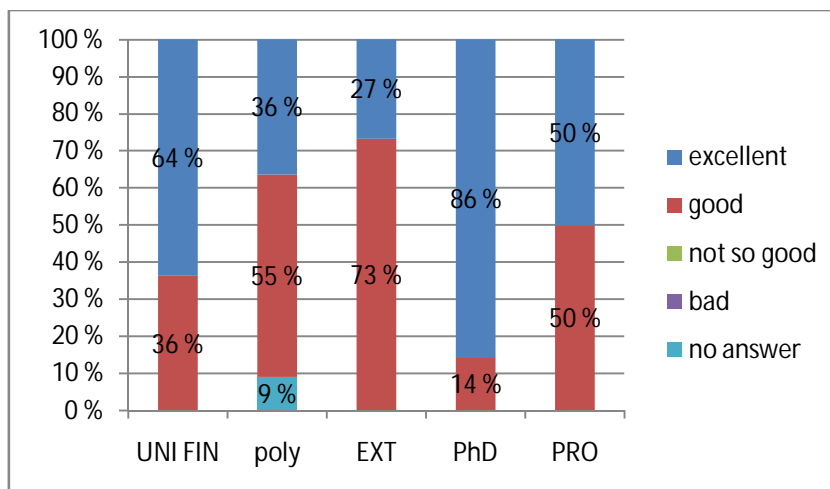
Figure 4.7. Evaluation of the course staff in different student groups (2009-2010)

4.1.2 Learning materials

Answers to the question *The video lectures were...* are presented in Table 4.6 One student each year has evaluated video lectures *fair (not so good)* or *poor*. Rest of the students has evaluated the video lectures quite evenly *good, very good* and *excellent*. The results of the version 1 are not fully comparable with the version 2 since the scale has been changed. In 2009-10 there was one choice less - *very good* was removed - and some choices were named differently. Version 2 choices are presented inside the parentheses. The only significant change regarding video lecture satisfaction during the course history was from 2006 to 2007 when the proportion of the students evaluating video lectures excellent increased.

Table 4.6 *Evaluation of the video lectures*

Video lectures	Year 2006	2007	2008	2009	2010
Excellent	8 %	27%	22%	36%	40%
Very good (-)	46%	22%	37 %	-	-
Good	42%	43%	37%	62%	52%
Fair (Not so good)	0%	3%	4%	3%	4%
Poor (Bad)	4%	0%	0%	0%	0%
No opinion (No answer)	0%	5%	0%	0%	4%

When student satisfaction with the video lectures is studied in different student groups it emerges that the professionals have been the most content. 82% of them have evaluated video lectures *very good* or *excellent* while the proportion in other student groups varies from 33 to 52%. Those few students who evaluated the video lectures *poor/bad* were PhD students (Figure 4.8).
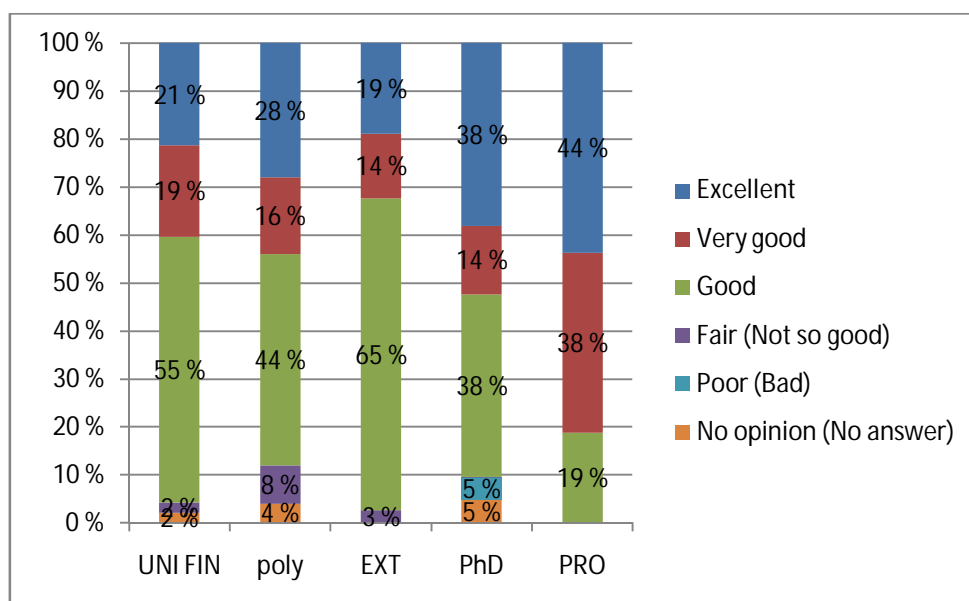

Figure 4.8. *Evaluation of the video lectures by student backgrounds (2006-2010)*

During the first course version it was asked whether students *…had problems with the video lectures? What kind of problems?* Answers to the open question can be classified under six headlines: no problems, problems with opening or the video stops while viewing, synchrony, too slow connection, problems with voice and other. Nearly half of the participants of the SSS version 1 didn't have any problems with the videos. The most common problem was that a video didn't open or it stopped during viewing. Students complained also about poor synchrony between lecture video and lecture slides, and video's voice. Too slow Internet connection bothered few students. Some video problems disappeared after the beginning of the course. One student expressed that the course organizer should make sure that its partner organizations have a functioning environment for course participation:

"In the beginning yes. TAMK computers and fire wall was set so that I was not able to see the videos. Had to see lot of trouble to work the issue. This could and should have been done by the course organizer before the course started and work the issue with institutions that can participate or at least give instructions to students to instruct the school right away. Finally, the computer centre solved the problem but it was not nice to spend time on solving this issue. Well, this is not perfect world we could possibly live in and maybe it can teach student some patience as well :)"

In 2009-10, the students evaluated the technical form of the videos. The vast majority of the students were satisfied with the technical form. Few students in both years evaluated the form *not so good* or *bad* and satisfaction (proportion of the students choosing *excellent*) slightly decreased from 2009 to 2010 (Table 4.7).

Table 4.7. *Evaluation of the technical form of the videos*

Technical form of the videos	Year 2009	2010
Excellent	46%	36%
Good	46%	56%
Not so good	5%	8%
Bad	3%	0%

When the opinions regarding technical form of the videos are studied in different student groups it emerges that all the PhD students or professionals chose *excellent* or *good*. Surprisingly the students less content with the technical form belong to the groups that presumably study in Finland and have access to fast Internet connection. Technical form of the videos was not asked as such in 2006-08, but when the results 2009-10 are compared with Figure 4.8 "Evaluation of the video lectures by student backgrounds (2006-2010 together)" and the open feedback regarding video problems, it can be said that the quantity of the technical problems with video lectures has decreased when the

new technology was adapted in 2009. This interpretation is based on the finding that in the open feedback over half of the students reported some problems with the videos while in Table 4.7 only 8% of the students each year evaluated the technical form *not so good* or *bad*. When the quality of the technical problems is regarded it is found (Figure 4.9) that with the current video lecture format the students in remote areas can follow the lectures without problems, but especially exchange students studying in Finland face problems.
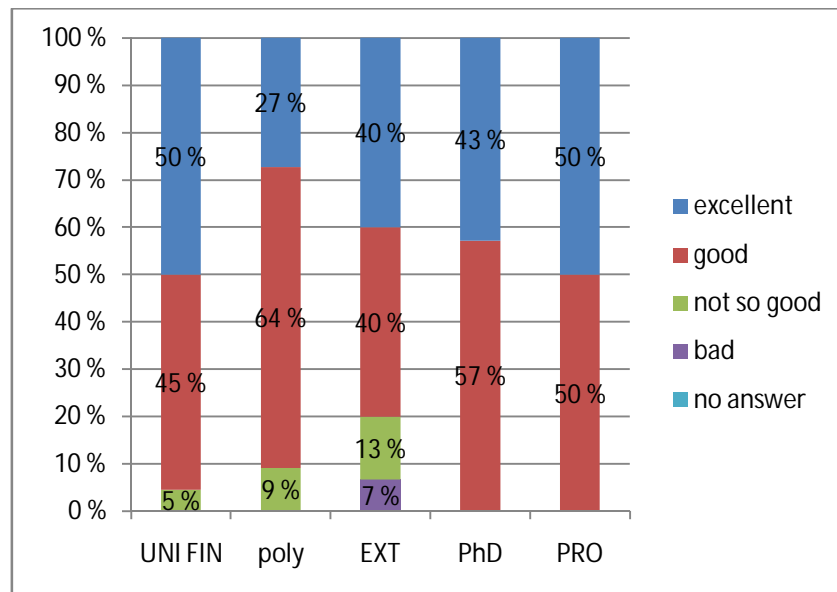
Figure 4.9. *Evaluation of the technical form of the videos in different student groups (2009-2010 together)*

All the respondents answered to the question *preferred video format*. As presented in Table 4.8, *videos with the picture* were preferred by most of the students. In 2009, *lectures with sound* and *lecture slides* were preferred by several students and in 2010 by one student each.

Table 4.8. Preferred lecture types

Students preferred	**Year 2009**	**2010**
Videos with picture	72%	92%
Lectures with sound	18%	4%
Lecture slides	10%	4%

When the students of the SSS version 2 are examined in groups, all of the groups prefer *videos with picture*. In each group, there are few students who prefer either *videos with just sound* or just *lecture slides*. None of the exchange students preferred *videos with sound* and none of the students of the Finnish universities prefer simple *lecture slides*. Some of the PhD students and professionals – including the students from remote areas – prefer *lecture slides* or *videos with sound*, but the proportion is not higher than in other groups. (Figure 4.10.)
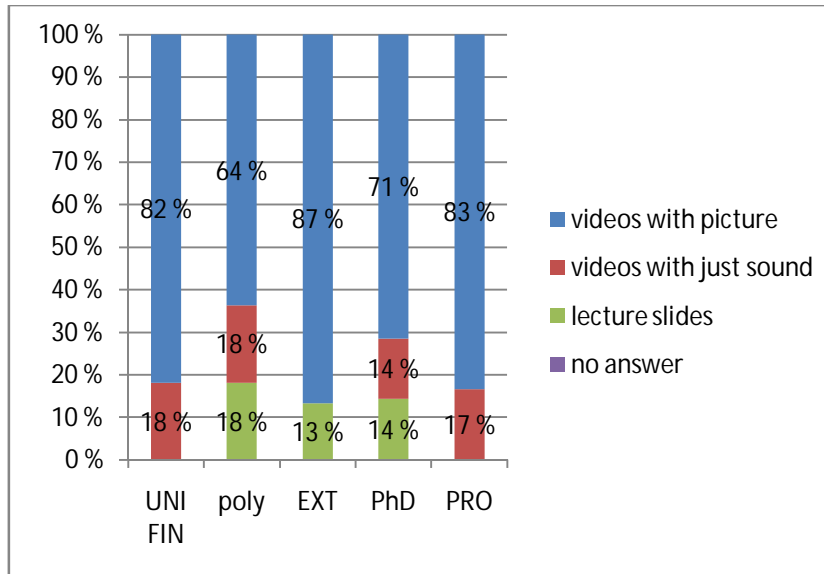
Figure 4.10. *Preferred lecture formats in different student groups (2009-2010 together)*

During the first course version, the question asked was *Reading material was...* When the course was updated the question was changed to *The material provided was*. All the respondents excluding one in 2009 answered these questions. Answers are not comparable because of different questions and different scales. Answer choices of version 2 are presented within the parenthesis (Table 4.9). Nearly all students have evaluated (reading) materials *good, very good* or *excellent*. One student in 2006 as well as in 2007 evaluated reading material *fair*.

Reading material (material)	Year 2006	2007	2008	2009	2010
Excellent	15%	30%	26%	62%	48%
Very good (-)	31%	46%	37%	-	-
Good	50%	22%	37%	36%	52%
Fair (Not so good)	4%	3%	0%	0%	0%
Poor (Bad)	0%	0%	0%	0%	0%
No opinion (no answer)	0%	0%	0%	3%	0%

Table 4.9. *Evaluation of the reading material (2006-08) and material provided (2009-10)*

When the contentment with the (reading) material is studied in different groups, it is found that the professional are the most content group (Figure 4.11) just like in the case of the other learning material, video lectures. Other groups are evenly satisfied with the material and overall contentment is slightly higher than it was in the case of the video lectures.
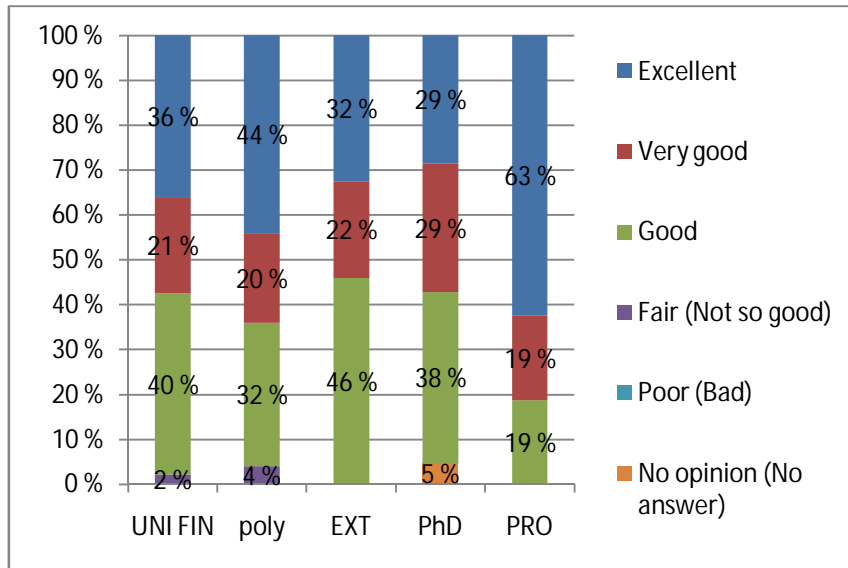
Figure 4.11. *Evaluation of the (reading) material by student backgrounds (2006-2010)*

4.1.3 Assignments

In version 1 the students were asked the question *The assignments were...* Yearly results are presented in Table 4.10. Contentment has increased after the first course implementation. Answers are distributed quite evenly between *excellent, very good* and *good.*

Table 4.10 *Evaluation of the assignments*

Assignments	2006	2007	2008
Excellent	4 %	38 %	37 %
Very good	50 %	32 %	41 %
Good	38 %	27 %	22 %
Fair	8 %	3 %	0 %
Poor	0 %	0 %	0 %
No opinion	0 %	0 %	0 %

When different student groups are regarded, the professionals are found to be the most content with the assignments just like they were with the learning materials. In other groups, the answers are more distributed. (Figure 4.12.)
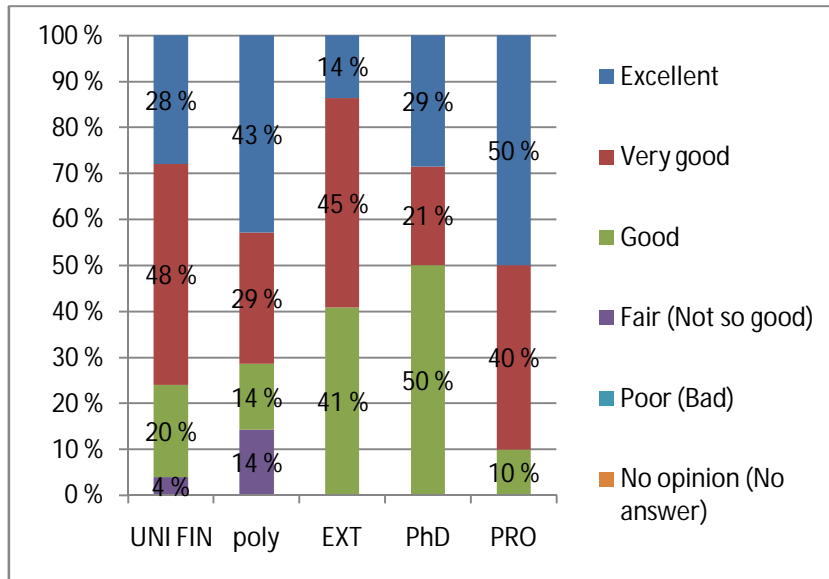
Figure 4.12. *Evaluation of the assignments by student backgrounds (2006-2010)*

In 2009-10, students were asked questions regarding quizzes, discussions and group works, but not written assignments. As seen in Table 4.11, over 80% of the students found quizzes *excellent* or *good*. Contentment, or proportion of the students choosing *excellent*, has slightly decreased from 2009-10.

Table 4.11 *Evaluation of the quizzes 2009-10*

Quizzes	2009	2010
Excellent	36 %	12 %
Good	46 %	72 %
Not so good	18 %	16 %
Bad	0 %	0 %
No answer	0 %	0 %

When quiz evaluation is studied in different student groups (Figure 4.13), *UNI FIN* students and professionals are found to be the most content; students of the Finnish universities have chosen *excellent* more often than the other students and among professionals nobody has chosen *not so good*. Exchange students are the least content group since they have chosen *excellent* the most seldom and *not so good* the most frequently.
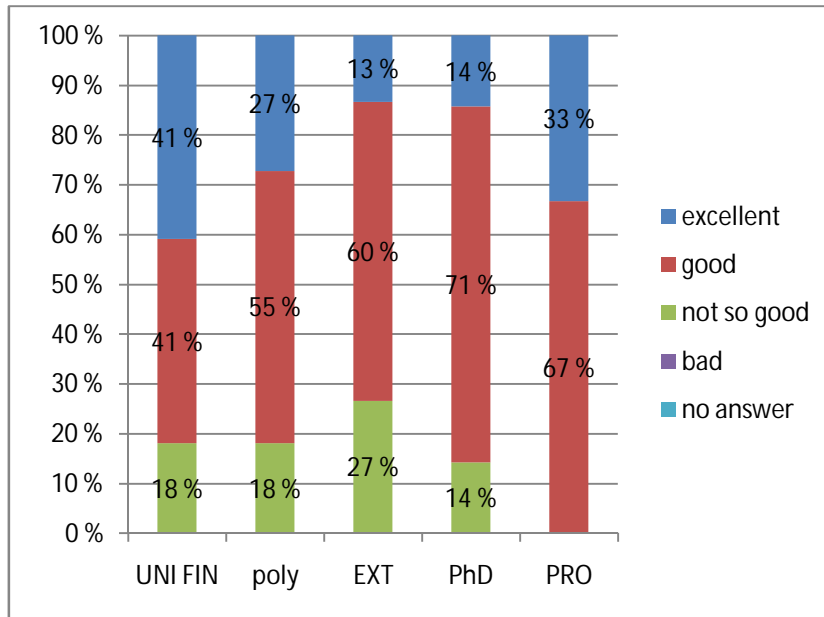
Figure 4.13. *Evaluation of the quizzes in different student groups (2009-2010 together)*

In Table 4.12, student contentment with the technical form of the quizzes is presented and it can be seen that the students find quizzes technically slightly better than in general.

Table 4.12 *Evaluation of the technical form of the quizzes (2009-10)*

Technical form of the quizzes	2009	2010
Excellent	41 %	20 %
Good	49 %	72 %
Not so good	10 %	4 %
Bad	0 %	0 %
No answer	0 %	4 %

Among the student groups, especially exchange students evaluated quizzes technically better than in general. Also professionals were more content with the technical form. Finnish students actually had an opposite view and they evaluated quizzes in general more positive than their technical form. Few *poly* students didn't answer the whole question. (Figure 4.14.)
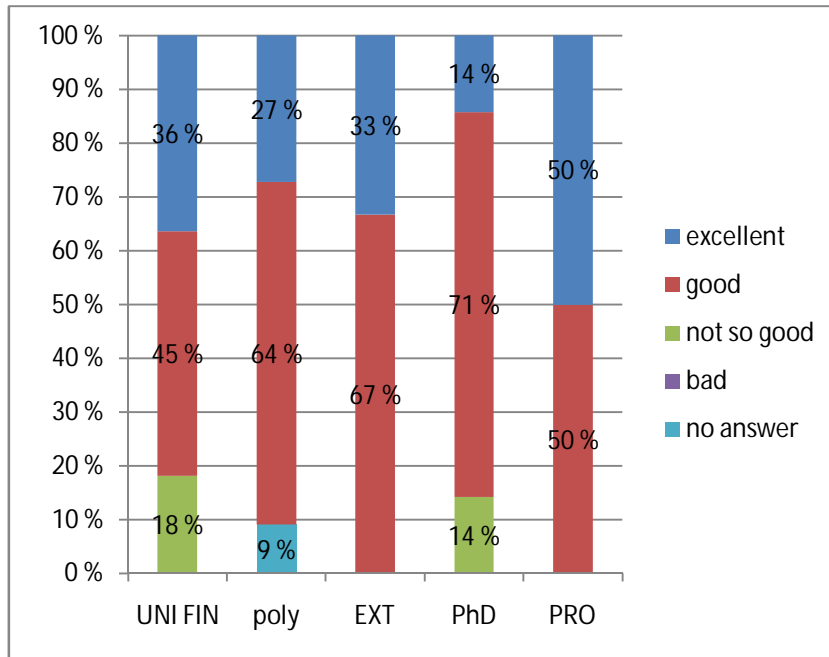
Figure 4.14. *Evaluation of the technical form of the quizzes in different student groups (2009-2010 together)*

Group work was evaluated similarly as the discussions. As seen in Table 4.13, over 80% of the students found group work *excellent* or *good* and the satisfaction slightly decreased from 2009 to 2010. Few students evaluated group work *bad*, which didn't happen in the case of quizzes.

Table 4.13. *Evaluation of the group work 2009-10*

Group work	2009	2010
Excellent	38 %	24 %
Good	46 %	72 %
Not so good	8 %	4 %
Bad	5 %	0 %
No answer	3 %	0 %

Figure 4.15 shows that for once the exchange students are the most content group. While about one third of the students in other groups chose *excellent*, none of the professionals did that. They also chose *not so good* more often than the other groups and were therefore the least content group. When Figure 4.15 is compared to Figure 4.13, interesting results are seen: Exchange students and PhD students prefer group work when compared to the quizzes while professionals prefer quizzes.
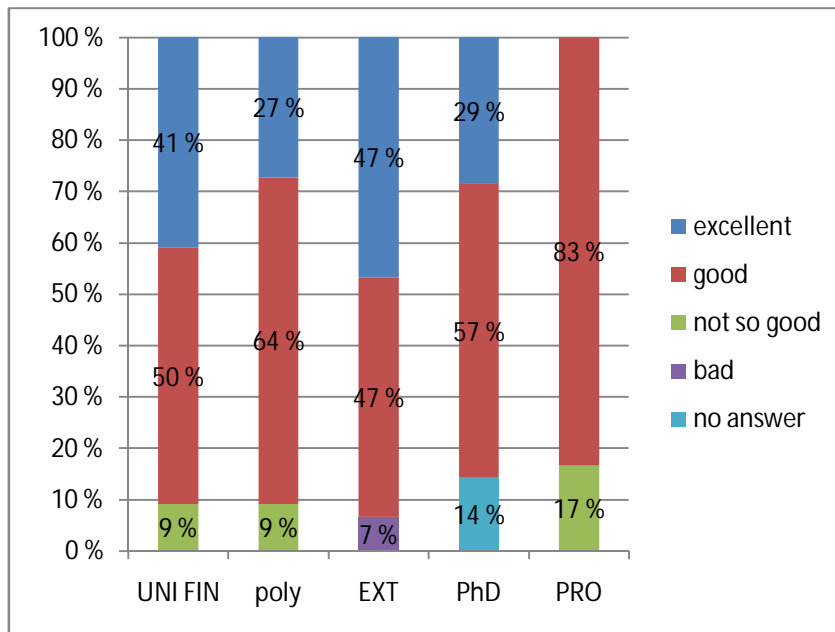
Figure 4.15 *Evaluation of the group work in different student groups (2009-2010)*

In general, the *technical form of the group* work was evaluated *good* by over half of the students, *excellent* by more than one fourth of the students and *not so good* or *bad* by less than one fourth of the students. On average, students were slightly more content with the *group work* than *technical form of the group work.* (Table 4.14.)

Table 4.14 *Evaluation of the technical form of the group work 2009-10*

Technical form of the group work	2009	2010
Excellent	31 %	24 %
Good	51 %	72 %
Not so good	13 %	4 %
Bad	5 %	0 %
No answer	0 %	0 %

As seen in Figure 4.16, exchange students were even more content with the technical form of the group work than group work in general. Also some professionals found technical form *excellent* even though none of them found group work in general *excellent*. On the contrary, students of the Finnish universities and polytechnic students found other parts of group work better than its technical form.
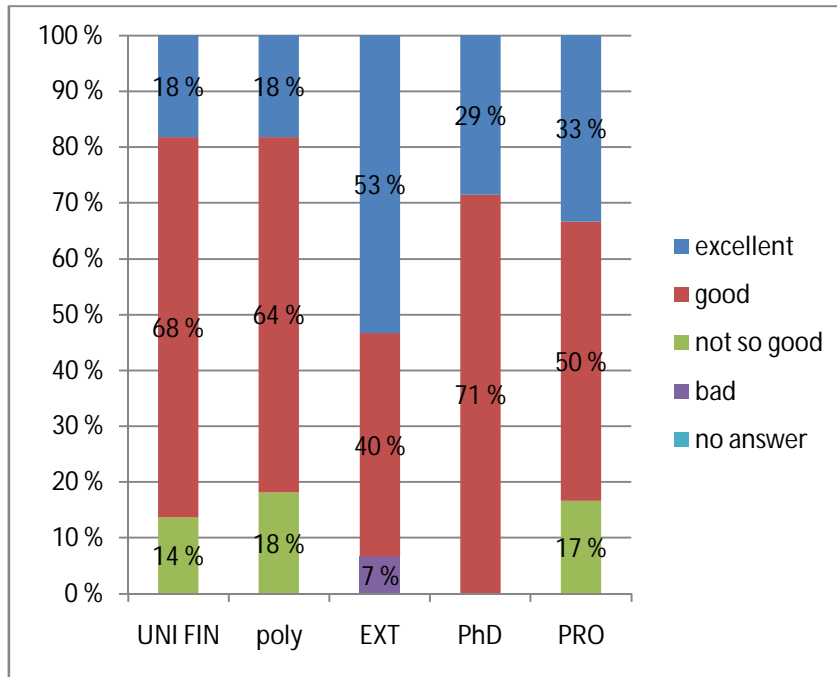
Figure 4.16 *Evaluation of the technical form of the group work in different student groups (2009-2010 together)*

As seen in Table 4.15, around 10% of the students faced difficulties in finding group for the group work. Situation has remained similar from 2009 to 2010.

Table 4.15 *Evaluation of finding group 2009-10*

Finding group	2009	2010
Very easy	33 %	36 %
Quite easy	51 %	56 %
Quite difficult	13 %	8 %
Very difficult	0 %	0 %
No answer	3 %	0 %

None of the professionals found it *very easy* to find the group and they evaluated it *quite difficult* more often than the other groups. Polytechnic students also had some difficulties in finding group. Finnish student found the group very easily more often than the other groups. However, there were several Finnish students who found this *quite difficult*. Exchange students and PhD students didn't have problems. (Figure 4.17.)
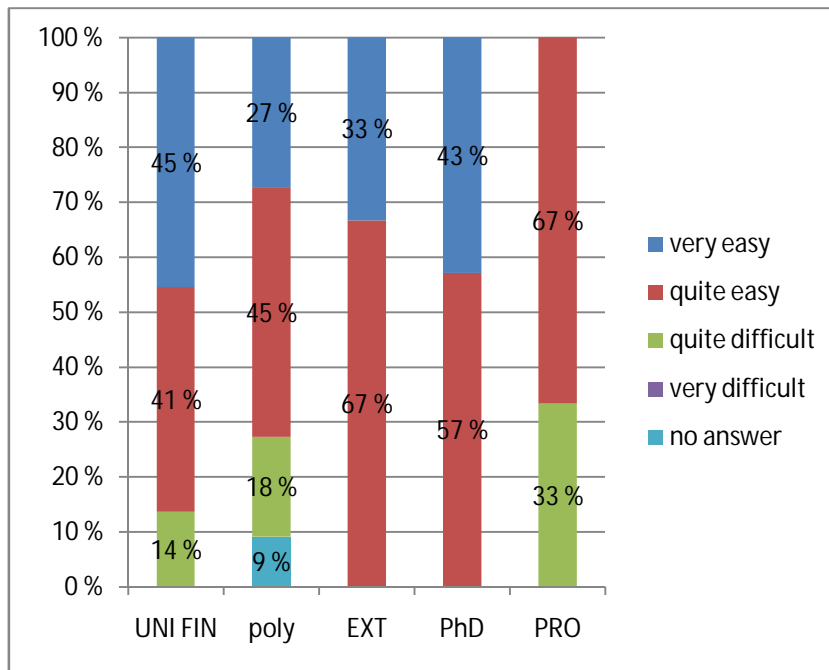
Figure 4.17 *Finding group in different student groups (2009-2010 together)*

Two thirds of the students evaluated discussions good while 20-30% found them *excellent* and one student each year evaluated them *not so good*. Not significant change from 2009 to 2010 is seen. It could be said that discussions are evaluated slightly better than quizzes and slightly worse than group works. (Table 4.16)

Table 4.16 *Evaluation of the discussions 2009-10*

Discussions	2009	2010
Excellent	33 %	20 %
Good	62 %	72 %
Not so good	3 %	4 %
Bad	0 %	0 %
No answer	3 %	4 %

Exchange students and PhDs liked the discussions less than other groups. Professionals chose *excellent* more often than the others, followed by polytechnic students and Finnish students. The only students evaluating the discussions *not so good* were polytechnic students; their answers were the most distributed. (Figure 4.18.)
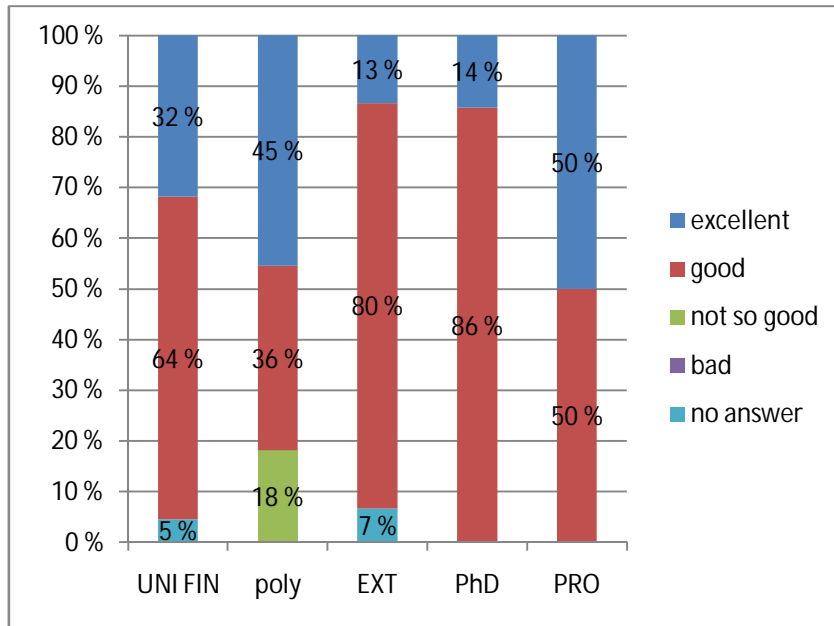
Figure 4.18 *Evaluation of the discussions in different student groups (2009-2010)*

Table 4.17 is similar to the previous table. In other words, discussions in general were evaluated similar to the technical form of the discussions.

Table 4.17 *Evaluation of the technical form of the discussions (2009-10)*

Technical form of the discussions	2009	2010
Excellent	33 %	24 %
Good	54 %	76 %
Not so good	13 %	0 %
Bad	0 %	0 %
no answer	0 %	0 %

Also the distribution in Figure 4.19 is similar to that in 4.18 meaning that the same student groups that liked discussions liked also its technical form. Only exchange students make an exception and are quite satisfied with the technical form of the discussions even thought they are not satisfied with the discussions in general.
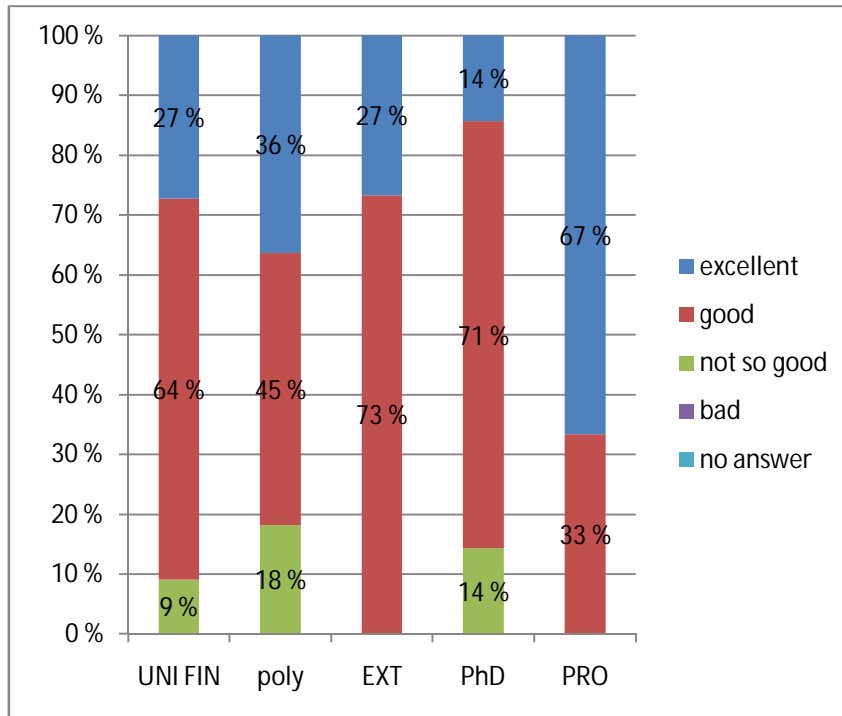
Figure 4.19. *Evaluation of the technical form of the discussions in different student groups (2009-2010 together)*

4.2 Open questions

4.2.1 What did the participants most like about the course

During the course version1 the students answered to the question *What did you most like about the course?* In the version 2 the question was *What parts of this course did you especially like?* Answers are classified under four headlines, which figure frequently in the feedback: content, interaction, implementation and flexibility. Summary of the answers is presented in Table 4.18. For example, in 2006 35% of the respondents mentioned content. Because each answer could have been classified under one or more classes, depending on how many issues a respondent mentioned, percentages add up to more than 100% each year (the second last row, Table 4.18). As seen in the last column, on average over half of the students were satisfied with the course content, nearly half of the students liked interaction and several students mentioned issues related to implementation or flexibility. As seen from the last row, about 10 % of the respondents didn't answer this question and they were mostly students who didn't give any open feedback. When the course was updated in 2009, proportion of students satisfied with the content increased. In the next text it is explained what kind of comments each class included.

Table 4.18 *Summary of the answers to the questions "What did you most like about the course?" and "What parts of this course did you especially like?"*

CLASSES	2006	2007	2008	2009	2010	On average
Content	35 %	51 %	44 %	92 %	60 %	59 %
Interaction	62 %	38 %	44 %	38 %	52 %	45 %
Implementation	35 %	35 %	26 %	23 %	20 %	28 %
Flexibility	27 %	14 %	11 %	15 %	12 %	16 %
Together	158 %	138 %	126 %	169 %	144 %	148 %
No answer	4 %	16 %	11 %	15 %	8 %	12 %

Content

The class content includes the comments which acknowledge the course content as a whole or its details such as particular expert lectures. The course topic and content were mentioned to be eye-opener, new, up-to-date, extensive and revolutionary, among other things. Some of the professionals found the course useful in their work. Next quotations are examples of these comments.

"The video lectures of great people from various backgrounds. Some were Medical Doctors, Sanitation engineers, Geologists ... everyone was here."

"Honestly, I am young, I come from France and at the beginning of the course, I have never thought that my toilet in France (flushing toilet) could be unsustainable and not good for the environment. In fact, I thought that these toilets were one of the best ones. I know, now I think it was stupid."

"This whole course was very good and opened your eyes to realize how important sanitation and clean water is."

All the modules (see Appendix 1 and 2) were mentioned in the positive feedback, but some of them more frequently than the others. Especially two modules – *3 Health and Safety* and *4 Re-use of excreta* – were acknowledged. The Module 3 was mentioned nine times and the Module 4 ten times during the course history, while other modules were mentioned 2-4 times. Below is one comment regarding the Module 3.

"*I enjoyed the video lectures by the woman from the Philippines. It wasn't just that she spoke clearly, but her presentation and lecture was well organized and thought out, it made the whole thing actually very entertaining to watch and her enthusiasm was obviously engaging.*"

While giving feedback, some students became inspired to reflect their learning process as in the next quotation.

"The most interesting topic in this course which I like is development cooperation which include sanitation experiences from least developing countries like Ethiopia, Sambia and Nepal. Being Nepali, for me I was excited to learn about opportunities and challenges related to increasing access to sustainable sanitation facilities in Nepal. It reflects that sanitation is behavior, more you practice, more you will be familiar and be habitual to it. The main challenges in developing countries are due to lack of political interest, improper sustainable sanitation development agenda, unawareness, illiterate, lack of liabilities towards health, lack of technical manpower and efforts and so on. The opportunities of sustainable sanitation in through concept of dry toilet, good modalities implementation, proper policy and guidelines, awareness, education and most important public empowerment on decision making process."

Interaction

The SSS students have enjoyed the international atmosphere of the course and learning from other students with different backgrounds. The class interaction contains the comments that express contentment with the interaction directly or indirectly; some students mentioned interaction or international atmosphere while other comments regarded discussions, group work and commenting. Also openness was mentioned. Below there are few comments illustrating this class.

"People were commentating more than in normal Finnish lecture rooms. Especially for us Finnish students opening the mouth is sometimes too hard."

"I liked the international atmosphere of the course. It was also nice that on this course there were participants with different experience on sanitation issues."

"I especially like the group works because I don't really like online courses. I think it make the course more living."

Implementation

This class includes comments regarding course organization: weekly assignments, instructions and tutoring. It is not perfectly clear which comments belong to this class and which one belong to the class interaction. Especially the comments regarding interactive assignments and student-teacher interaction, in other words tutoring, are classified to one or both of the classes, depending on how the student expressed him/herself.

The students liked the problem based learning method and the fact that the course was completed with the weekly assignments. In 2006-08 the variety of the assignments was mentioned. This comment didn't occur later, possibly because the fertilizer plan assignment that differed from the other assignments, was replaced by another quiz. However, still in 2009-10 assignments in general or one particular

assignment were mentioned frequently. Some comments regarding assignment and pedagogical part are quoted below.

"The pedagogic part was good. ... Assignments and quiz were adequately set up to test the understanding, knowledge and skills of participants."

"The quizzes were quite a good addition to the lectures, as they helped to maintain focus. "

"I also liked to write about sanitation experiences. (I just wish that my grandmother would still live, now I would have even more questions for her...)"

Students were also content with the clear course schedule, instructions and feedback and help from the teachers and tutors as illustrated in the comments below.

"The parts i like about the course is that everything is well organized and accurately given."

"I also appreciate the comments of the instructors and their respectful attitude towards the students. Thanks!"

"Course instructions were very clear and the staff very helpful. At least I got answers to my questions in problem cases very fast. Thank you for that!"

Flexibility

The fundamental advantage of online learning, the possibility to work when and where ever suits the student best is appreciated also by the SSS students. Online learning environment also supports different learning methods to certain extend. Some students prefer independent work itself while others appreciate also asynchronous interaction allowed by an Internet learning environment. Possibility to go back to the lectures is also appreciated. One aspect of flexibility mentioned by the students is possibility to choose suitable learning materials. Students have different learning methods and some are best supported by videos and others by lecture slides. These aspects are illustrated below.

"Moodle worked well and it was quite easy to keep up with the course with almost daily checking up and at least weekly works. Even though lectures and quizzes took time a couple of hours at one occasion, it was okay because you could do it when ever it suites you best."

"It is actually very good when presentations can be seen online (no need to travel and the state-of-the-art info can also be seen in developing countries)."

For the maximum flexibility it is important to offer all the materials, assignments and deadlines already in the beginning of the course. In 2010, when the learning environment was ready when it opened to the students, they appreciated the possibility to plan their time allocation in advance and avoid overlapping with other work and e.g. trips. This is put by the student's own words.

"It was good that the exercises were made available prior to the actual week when they were due, as it was easier to manage time and other activities and finish the exercises well in advance."

4.2.2 What did the participants most dislike about the course

After the version 1 the students answered to the question *What did you most dislike about the course?*. In the version 2 the question was *Which parts of this course did you enjoy the least and why?* Answers are classified under seven headlines, which figure frequently in the feedback: group work, assignments, learning materials, schedule, content, learning tools and nothing. Each answer can be presented under one or more classes. In 2006 and 2009 when the SSS workshop took place, the students gave both positive (Table 4.18) and negative feedback more actively than in other years. Summary of the answers is presented in Table 4.19. For example, in 2010 8% of the respondents mentioned group work.

Table 4.19. *Summary of the answers to the questions "What did you most dislike about the course?" and "Which parts of this course did you enjoy the least and why?"*

CLASSES	2006	2007	2008	2009	2010	On average
Group work	35 %	16 %	15 %	18 %	8 %	18 %
Assignments	23 %	16 %	7 %	18 %	20 %	17 %
Nothing	0 %	11 %	15 %	21 %	20 %	14 %
Learning materials	0 %	5 %	15 %	10 %	8 %	8 %
Schedule	8 %	5 %	4 %	5 %	0 %	5 %
Content	4 %	3 %	4 %	8 %	4 %	5 %
Together	69 %	57 %	59 %	79 %	60 %	66 %
Nothing	23 %	16 %	7 %	13 %	8 %	14 %
No answer	19 %	32 %	37 %	23 %	36 %	29 %

Group work
As presented in Table 4.19 above, group work is the most disliked part of the course. Students criticize working in the group from three viewpoints and this critic has stayed

similar during the course history. Firstly, students prefer working alone because they want to adjust their own timetables, without a need to arrange meetings and working times with the other students. Long distances and different working hours make cooperation complex. The next quotation illustrates this problem.

"I expected to do this course anytime, whenever I wanted. Working in groups was a small problem for me, because I could not be online when my group mates where online. Working in a group through the internet is not so easy and takes a lot of time."

Secondly, there are students who find it difficult to cooperate in the Internet and feel that face to face contacts would enhance work quality. Thirdly, when group work partners don't know each other beforehand, the students might have different expectations for work quality and some students are more motivated than the others, which can lead to uneven share of work. This is especially a problem in online environment where the students don't know each other beforehand and communication possibilities are limited. These problems are illustrated in next two quotations.

"The group work. I had a nice group and everyone worked, but a face-to-face meeting didn't happen."

"The group work wasn't too good because we didn't know at all who we where working with and how committed they were to the group."

Assignments
The next con in Table 4.19 is assignments. This class includes other assignments than group works and what have been criticized are quizzes and discussion forums. Individual written assignment, *Memories of Sanitation*, has not received any negative comments. Pedagogical quality of the quizzes was questioned as illustrated in the next quotation.

"Probably the quizzes. I dislike assignments that are about finding a single tidbit of information ("how many percent..") instead of assignments that would require a broader understanding and possibly self-reflection."

As already mentioned in the context of group work, students' varying skills and motivations effect on the assignments that require group work, discussion or peer review. In the next quotation a student expresses his disappointment with unmotivated discussions and ponders possible reasons for it.

"I thought there were some students who were very thoughtful and contributed to lively discussions and had projects that were interesting to review. Others seemed to not be very interested. Perhaps there is a language barrier that prevented full participation."

In addition to the critics concerning specific assignments, there were several comments concerning assignments in general. Students mentioned that assignment instructions and evaluation were not clear and they would have liked to receive more feedback from the teachers. Assignments were also mentioned to be too similar and they should have been better linked to the lectures and reading materials.

Learning materials
Learning materials criticized were video lectures that received critics from several respondents and reading materials that were mentioned more seldom. Some comments regarded the whole module. Students had technical problems with the videos as explained earlier. In addition video lectures were evaluated too long even in 2009-10, when they were shorter than earlier. Next comment illustrates problems with long video lectures.

"The long videos of some weeks, it is too hard to pay attention to the screen of your computer that much time, maybe in a classroom with a real teacher is possible but not with a video."

Some students were disturbed by the lecturer moving around on the video and some students were not content with the level of the lecturers' English. Cultural awareness of the lecturer is questioned in the following quotation.

"The level of spoken English of some Finnish lecturers was really low and I didn't like the patriotic "we won the war cause the Russians didn't know how to use the toilet"- parts, patriotism shouldn't exist on a university course and especially on an international course it is not at all politically correct."

Reading materials were mentioned to be too long, as in the next quotation, and their presentation in Moodle unclear.

"Some of the reading material which was behind links was overwhelmingly long! Just to go through such huge amounts of info on a computer screen devastating..."

Most of the comments regarding learning materials were not specified to the certain lecture or module. The module of *History of Sanitation* was an exception and it was mentioned to be the least interesting module.

Schedule
Students had difficulties to stay in the weekly schedule due to three reasons. Firstly, some students told that they had too much other work and could therefore not invest as much time for the course as needed.

"Tight schedule but that was my own fault."

Secondly, few students had problems to make themselves to work on their own.

"The deadlines were too tight, i did not so much enjoy it particularly when it makes it difficult for me to settle down and answer the questions. I actually have a schedule different from that of the Tampere University."

Thirdly, students wanted to plan their work beforehand and found it troublesome, if all the materials and assignments were not available already in the beginning of the course.

"All the assignments should be available in my opinion, for example I noticed the second group work just when I was leaving to Estonia (school trip) so I was really stressed to do it before I left and contacting the group and actually doing something took few days."

It was also mentioned that the deadlines were too strict and having to do an assignment every week made schedule challenging.

Content
Several students mentioned the course content to be too general. According to the students, it would have been better to go deeper into some topic or case and leave some topics out if necessary. In one comment, the lectures were said to be partly overlapping and in another comment it was suggested that they could be more linked to each other. In the next quotation a student demands more scientific approach.

"The course was a bit too pro dry-toilet without questioning or discussing the problems and risks. I would have preferred a bit more scientific approach."

Learning tools
The learning tools discussed here include Moodle and A&O learning environments in the Internet and their activities such as discussion forums and quizzes. Also video lectures are included in the tools. Students from remote areas have had problems with the Internet connection and this had caused them serious problems in accessing the learning materials.

"my problems with internet. All because this Thai internet provider"

Students with the fast Internet connection have had some problems with videos as mentioned earlier. Serious problems such as videos that do not open were mainly solved

with the new course version. Minor problems such as confusing system to add comments on forums still existed and bothered students.

Nothing

14% of the students during the course history have mentioned that they didn't have any part of the course that they did not like. If 29% of the students not answering to this question are regarded, it adds up to 43% of the students. In other words nearly half of the students have not had need to give negative feedback at the end of the course.

4.2.3 Ideas and suggestions for the course

During the version 1 the students were asked *What changes or ideas you suggest for the course? Any important topics totally missing?* and the corresponding question in the version 2 was *How to improve?* In the following text all the ideas are compiled under relevant headlines: Content ideas; Instructions, feedback and tutoring; Assignments; Learning tools; Continuity.

Content ideas

The topic that appeared in the suggestions the most often, was existing and under development SSS technologies. Also economic evaluation of alternative sanitation was asked for. Some students suggested that the aspect of water supply as well as sustainable not-dry sanitation solutions should be handled. In 2006-08, social and cultural aspects were wanted. The course has an emphasis on developing world and the students suggested that SSS in developed world should be handled as well. In the next quotation there is a representational description of practical information that students need. They want to understand the whole cycle from toilet to field (and plate), the technological possibilities, risks and social aspects.

"Content-wise ... there seemed to be missing information on the nuts and bolts of composting. For example, how do separating toilets work? What are the conditions needed for safe composting and how much care must be taken? The main risk was said to be helminths; I would not have guessed that. It still seems that there would be risks from other microbial contamination and I would have liked to see more emphasis that this is something that will be of benefit only if done well and if we take the risks seriously. Some of the student comments seemed to indicate this could be done casually and I wonder if that is a valid thing to take from the course. On a related note, it would be interesting to see a lecture on a case study where this has been implemented, following the waste, both urine and faeces, from creation to final use in agriculture. Perhaps both in and urban setting like your university and then in a rural setting."

In addition, students want the information described above in well structured form. More time could be allocated for the most important topics such as technical solutions and the time could be reduced e.g. from History of Sanitation module. Also better nexus

between the topics handled was suggested. One student suggested that practical part should be added to the course.

Instructions, feedback and tutoring

From the quotation above it is smooth to continue to the teachers and tutors role on the course. In the quotation a student expresses his concern regarding "wrong information" spread on the forum. Teachers are expected to take part on discussions, give feedback for the assignments and give clearer instruction to the assignments, especially group works. Students also wish that the grounds for grading are explained beforehand. Deadlines and workload should be available straight from the start.

In addition to this, students suggested teachers to consider cultural differences in tutoring as presented in the next quotation.

"Sometimes commenting other persons work via website is a bit difficult. It is very good way to learn, I agree, but in multicultural course the interpretation of comments may vary. I have not so much experience of multicultural situations. But the experience which I have is that the way of commenting is a bit different in different cultures. E.g. in African and Asian culture you are very polite, if you are a student. Especially if the person is older than you. And then in some European countries you are very critical, and try to find all "mistakes" when commenting. Maybe some instructions or "cultural explanations" for commenting could be provided? Or maybe instead of commenting persons could make 3 questions about the issues they are wondering in the work?"

Also better information regarding time zones and their influence on deadlines was advised to be given. According to teachers English skills, there were two opposite opinions. Firstly, some students were annoyed by the low level of some lecturers' spoken English. On the other hand, one student wrote that it is a relief for a student who is unsure about his/her English skills that the teachers don't speak perfect English either. Comments regarding language skills were made in the context of video lectures, but are applicable also for the English level of tutors and teachers acting in the learning environment.

Assignments

In addition to clear instructions and feedback mentioned above, students had some suggestions for improvement of current assignments and development of the new ones. Several students suggested that the assignments should be better related to learning materials and that the quiz answers should be available for the students. One student suggested that the questions 5 and 6 in the quiz "Some questions about sanitation under Stress" were unclear. It was also suggested that more time could be given for sanitation plan group assignment.

Other suggestions regarding assignments are rather contradictory. There are suggestions for each: more/less group work/quizzes/discussions and option to do group

work individually. One student wrote that an exam at the end of the course would be necessary. Some students suggested easier way for grouping. Also readily formed groups and commenting order were suggested. In the next quotation a reference for better practice is given.

"Commenting the others' group works was tricky, checking which ones had already been answered took loads of time and some groups had made several works which made commenting confusing. I would have done it in the same way as on the course Strategisen johtamisen perusteet, where the essays are addressed to certain students automatically and one gets even more detailed feedback from them."

Some students suggest that the quizzes should be replaced by e.g. written assignments. New ideas for assignments included design assignment and problem solving group works based on design and site assessment. It was also suggested that real pictures posted to Moodle database would make assignments livelier. One student suggested more extensive assignments and as a consequence more credit points for the course.

Learning tools
As mentioned earlier, a few student have faced serious problems opening the videos even in 2009-10 when new video format has been used. They have suggested better technical solutions for the course. Several students suggest replacing the longest videos with shorter ones. One student suggested that the videos should be more active or they could be simply removed.

In the next quotations ideas regarding possibilities to follow the lectures anywhere and anytime are presented.

"It would be good if participants of this course would have a change to save the video lectures."

"It would be great if the presentations were somehow portable so they could be viewed on a portable player. I don't know if the technology exists, sort of like a rental, that would allow this while still respecting the intellectual rights."

In addition to the comments regarding the video lectures, some students suggested technical solutions that facilitate communication in the virtual learning environment.

Continuity
In addition to the above presented ideas for saving files, some students have suggested the learning environment would be accessible to the students after the course. The learning environment could serve as learning material storage as well as a meeting forum for professionals. In the next quotation one student explains this in his own words.

"Please make the course available to the participants even after the completion of the course such that we could use it for various training and other academic purposes. For example, launching forthcoming courses in similar but different page could be better. ... For this, I request the entire course team and TUT/department to establish a Society of SSS participants. Otherwise, having just been certified and isolated doesn't make a big difference. So the vision, mission and expectation of TUT can be practically be implemented through an international community (said society above). In addition it helps to widen the outreach of both TUT and SSS. ... And the expanding form of forum (society) of SSS graduates every year would be highly advantageous."

As one student suggested the learning environment could serve also continuously as a course platform for groups of students in different locations. To reach this openness and availability from remote areas, he suggested more flexible technical solutions. Students also suggested advanced level courses and field course.

4.3   Summary of the results

Comparisons within the questions are partly challenging because of feedback query form updates in 2009. Questions were renewed, new question were added and answer scales were changed. However, some careful comparisons are made here to summarize the Chapter 4. Overall the student satisfaction was high. The most content the students were with the course is general: course content and international atmosphere of the course. According to the structured questions, the learning materials were slightly less satisfying than the course in general and the least content the students were with the assignments. The open feedback results describe and supplement the results of the structured feedback.

The results regarding the course in general can be summarized as follows. The response distributions were similar and positive in all questions measuring general satisfaction with the course. Weak points were not found. However, there were differences between the responses of the different student groups. The professionals were the most content with the course in general, course structure and course instructions. PhD students were the most content with the course staff. Exchange students were the least content with all of these. University students found workload light more often than others and polytechnic students found deadlines tight more often than the others. Both workload and deadlines were evaluated harder in 2009 than 2010.

If two types of learning materials – video lectures and reading materials – are compared, it emerges that during the last course implementation (2010) the students have been nearly equally content with the both. The same videos were used in 2009, but then the students were more content with the reading material than the videos. In 2009 36% of the respondents evaluated video lectures excellent while 62% found reading material excellent. Also during the earlier implementations the students have been more

content with the reading materials than the lectures. The professionals are the most content with the both learning materials while other groups don't differ from each other and contentment with (reading) material is a bit higher than the contentment with video lectures.

The questions measuring student contentment with different assignments are easily comparable because they were only asked in 2009-10 and the scale or the question format has not changed during the course history. Comparison of the results is presented in next Figure 4.20. Each assignments and technical form of the assignments is found excellent or good by more than 80% of the students. The students find group work excellent slightly more often than quizzes or discussions, but on the other hand it is the only assignment that is evaluated *bad* by a student. Quizzes are again evaluated not so good more often than other assignments. In the case of quizzes the technical form is evaluated excellent more often than the assignment itself, while in the case of group work the assignment is evaluated excellent more often than its technical form. Technical form of the discussions seems to be as good as the discussions in general. Technical form of the quizzes is evaluated slightly higher than technical form of the other assignments.
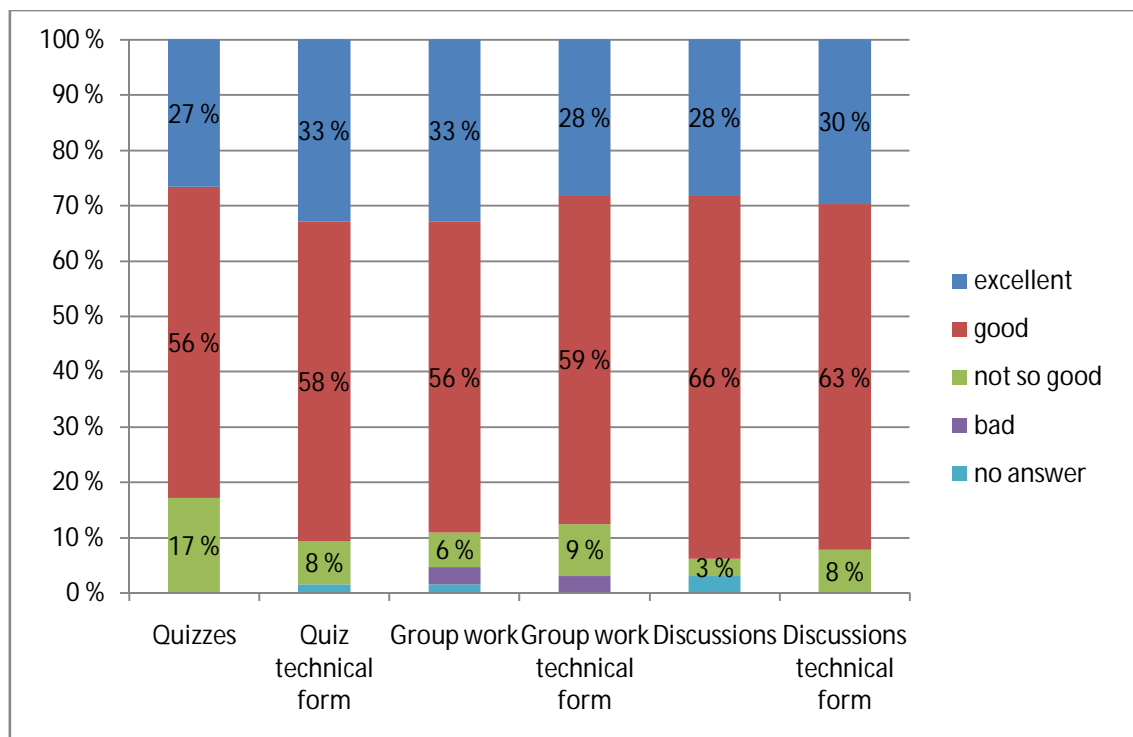
Figure 4.20. *Contentment with the different assignments (2009-10 together)*

When student satisfaction in different groups is compared, it can be summarized that the professionals preferred discussions, followed by quizzes and enjoyed group work the least. Exchange students enjoyed group work followed by discussions and liked quizzes the least. PhD students are critical towards assignments and especially they are not satisfied with the discussions and quizzes. In the groups of Finnish university students

and polytechnic students differences are not as clear, and in those groups all the assignment types have their fans.

Two open questions – likes and dislikes – are summarized in next two Figures 4.21 and 4.22.Two findings from the Figures can be highlighted. Firstly, the fact that 12% of the students did not give positive feedback, while the corresponding percentage in the case of negative feedback was 14+29 =43%. Secondly, the same issues emerge in the positive as well as in the negative feedback, especially interaction including group works divided opinions.

Figure 4.21. *Summary of the positive feedback*

Figure 4.22 *Summary of negative feedback*

The students gave development ideas related to content ideas; instructions, feedback and tutoring; assignments; learning tools and continuity. The ideas are discussed together with the other results and literature findings in the next chapter.

5 REFLECTIONS AND CONCLUSIONS

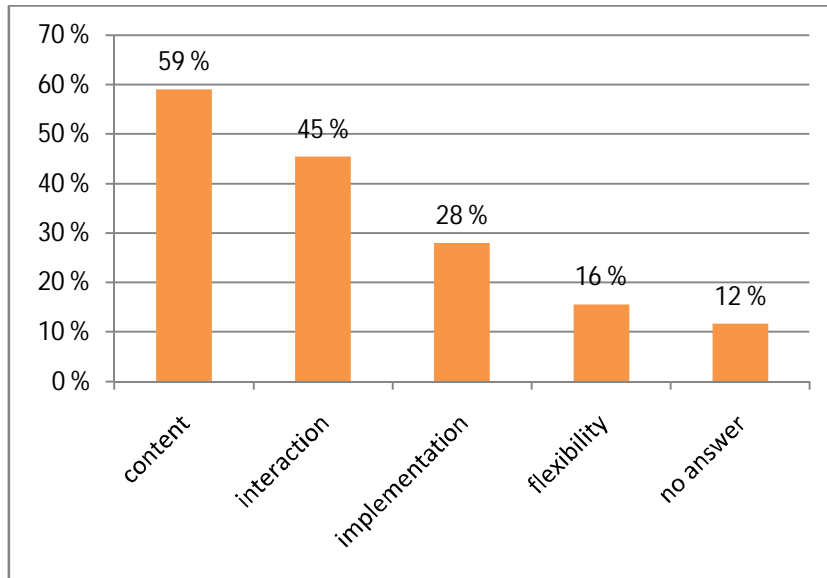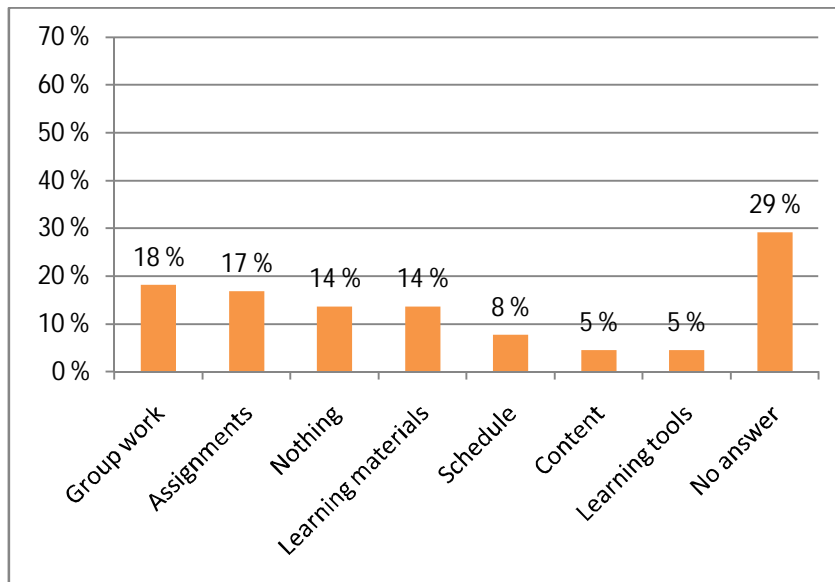This study supports mostly the former results. The course content, diversity in assignments and e-Learning course flexibility were emphasized also by the SSS students. In this study learner computer anxiety did not emerge, which may be due to the fact that different virtual environments have become more and more common in the everyday lives of the students. Instead, tutoring including instructors' attitudes towards e-Learning and the role of the international learning community appeared to be important. The student satisfaction is discussed under following headlines: Content, Diversity in assignments, Technical design and tutoring, Flexibility and Learning community. In addition two aspects connecting the study to the wider picture of e-Learning development – Institutionalization and Collection and usage of student feedback – are discussed.

The aim of this chapter is to answer the research questions "What makes Safe and Sustainable Sanitation (SSS) a successful course?", "What should be changed or developed for next implementation?", "What is the potential of SSS for virtual exchange?" and "How collection and usage of student feedback could be developed?". In this chapter connections within the survey results are made and they are reflected to previous literature.

5.1 Critical factors influencing learner satisfaction

5.1.1 Content

According to Sun *et al.* (2008) the course content is seen as the key factor when creating successful online courses. Also in this study the content appeared to be very important for the students and it was the most acknowledged factor of the course. The aspect of the course, revolutionary dry sanitation, together with the heterogeneous team of teachers and extensive, up-to-date materials form a base for high quality course content. *Module 3 Health and Safety* and *Module 4 Re-use of* excreta are especially successful modules, while the least satisfactory is the *Module 2 History of Sanitation.*

According to Marginson (2010) HEIs need to cultivate their local identity and at the same time cooperate openly with others in order to succeed in global knowledge economy. SSS is a dynamic combination of these: Dry sanitation is still flourishing in the Finnish countryside and recent legislation has created pressure to furthermore improve DT technology and increase its usage. In many other developed countries water based sanitation has replaced dry sanitation totally several decades ago. Due to cultural reasons as well as first hand experiences of dry sanitation usage and maintenance,

sanitation is not a taboo in Finland, which might be the case in many other countries. One important promoter of the dry sanitation is an NGO called Global Dry Toilet Association of Finland. Existing sanitation culture makes Finland a natural location for sanitation knowledge distribution. The other side of the coupling, openness and engagement with others, takes place in the International Dry Toilet Conference where the researchers of the field meet. The open international atmosphere of the conference and workshop has been successfully carried on to the online course.

Rizvi (2001, according to Coryell *et al.* 2010) has argued that internationalization requires higher education to design opportunities which focus on skills needed to develop a global imagination. In the Plan for Internationalization (TUT 2011) the same need is noted and the opportunities that TUT should offer to the students are discussed. The aims of TUT include regular visits of world-class foreign lecturers at TUT and joint courses, which enhance joint curricula and degree programs with partner institutions. SSS rises to the first challenge creditably by international online lectures to the students of TUT. "World-class quality" of the lecturers is guaranteed by the peer review process of the International Dry Toilet Conference. Joint courses, curricula and degree programs are still utopia that would require stronger unit level partnerships and/or arrangements in the university level.

The Internet has facilitated access to educational materials (Hatfield 1997) and nowadays the provision is nearly limitless. In this overwhelming library of resources, the teachers need to provide a big picture of the knowledge structures. (Anderson 2004.) SSS is interdisciplinary and in principle advanced level course, which is however taken by a heterogeneous group of students with different educational backgrounds. It is a challenge to form a big picture of the field or connect the content to the previous studies or knowledge of the students. Some survey results indicated that the student satisfaction was related to the student background and possibly to the students' previous knowledge in the field. For example, the professionals were the most content with the course in general and with the learning materials, while the exchange students were the least content with the both. Exchange students are mostly bachelor students from European countries and have usually low level of sanitation knowledge and experience while professionals naturally present the opposite background knowledge.

5.1.2 Flexibility

Online course flexibility is another important factor when creating successful online courses (Sun *et al.* 2008) and it is seen by a number of students as the greatest benefit of SSS. According to Marginson (2010), negative side of higher education globalization is "brain drain". It could be prevented by offering inviting online studies that allow freedom to study regardless of the location. The degree of the flexibility depends partly on the technology available for the course organizer and partly on the way the organizer uses the technology. SSS can be studied everywhere where there is a relatively fast Internet connection and a personal computer in use. Even more freedom regarding the location could be offered by a video lecture format that could be downloaded and

watched *via* a mobile device such as a portable player or a mobile phone. The students also have certain amount of temporal freedom, which can be further enhanced by offering all the course work to the students already in the beginning of the course so that they can plan and complete their studies according to their own schedule.

What is contradictory on online courses according to both, empirical results of this study and learning theories reviewed in the Chapter 2, are advantages of active learning community and the temporal freedom of online studies that attracts students. According to Anderson (2002), learner centered learning environment should accommodate diverse needs of students and teachers at different stages of their life cycles. The results of this study suggest that students learn in different ways and possibility to choose learning materials and methods that support ones' learning is one advantageous aspect of freedom and flexibility. Consideration of diverse needs requires flexible learning environment such as possibility to choose between group work and independent work. In practice a compromise between freedom and learning community participation needs to be sought.

Online course flexibility also has its disadvantages. Some students reported difficulties to cope with the weekly schedule and allocation of the independent work. Students might select web courses instead of classroom courses with clear schedule, when they don't have enough time to study. Online studies that are added to a full schedule can cause low motivation, underachievement and difficulties with workload and deadlines. Another reason for students to be encumbered with the work could be that the students from other organisations than TUT might be unaccustomed with the university working methods such as system of credit points, required workload, types of assignments and freedom of work.

5.1.3 Diversity in Assignments

Diversity in assignments is included in the list of the critical factors that influence learner satisfaction in e-Learning (Sun *et al.* 2008). In this chapter, the pedagogical side of the assignments is discussed in the light of e-Learning theories and the results of the study. In structured questions the students evaluate the learning tasks used in SSS positively, but less satisfactory than other components of the course – learning materials and course in general. On average, the group works were evaluated slightly higher than other assignments. However, all the assignments had their fans and there were significant differences between the student groups. The doctoral students were critical towards all the assignments, professionals liked discussions and quizzes better than group works, while exchange students found group work the best part of the course. In the open feedback interaction was acknowledged by nearly half of the students, and is therefore the second important factor influencing student satisfaction right after the course content. In addition the third important factor was course implementation which includes course completion with weekly assignments.

There were interesting results regarding the workload of the course version 2, which was considered high more often in 2009 than in 2010, even thought the workload

itself did not change. Explaining factor could be a group of foreign conference guests taking part on the online course right after the DT 2009 conference. The conference guests are not necessarily familiar with the academic practices such as plenty of home work with strict deadlines. The conference guests often study part time while working. Another explaining factor is tight schedule of 2009. Workshop materials were transferred to the learning environment within few weeks and therefore all the materials, assignments and deadlines were not available already in the beginning of the course. In the case of the deadlines, results are similar: In 2009 deadlines were evaluated strict more often than in 2010. Based on the explanation above, the course seems laborious, but the workload is in accordance with the 3 credit points and 81 hours of work and the deadlines are fair at least for the students of HEI's. The organizer should aim at finishing all the materials before starting the course.

Group works and discussions fit into the picture of the ideal online learning tasks described in the literature. They activate learning community, whose importance Lindfors (2010) has highlighted, present high-level challenges that are recommend for the online courses (Davidson & Waddington 2010) and encourage learners to assess their own learning reflectively, which is addressed by Anderson (2004). On the other hand, Davidson & Waddington (2010) have warned that forced interaction in discussion forum can create monochrome educational environments and reduce the quality of students' educational experience. In this study "forced" discussions were not panned by the students. However, some hints regarding the limitations of "the interaction assignments" were seen when highly motivated student expressed their frustration with sometimes unmotivated discussions. In SSS it seems that the most advanced students gain less from the learning community, while less advanced students learn substantially from other students. Ability to contribute in assignments requiring interaction is also the question of motivation. Professionals and PhD students are highly motivated students who had to make the effort to participate on the course, while for ERASMUS students there is only a limited number of courses available in English and some of them might take SSS without a great interest on the subject. Heterogeneous group of SSS students could possibly be helped to form even more motivated learning community with additional instructions and comments from the tutors/teachers in the beginning of the course. And finally, group work and discussions are essential part of SSS and should definitely not be removed. Possibility to choose independent work instead of (one) group work can be weighted up.

Apart from motivation and background knowledge, also different learning methods influence on satisfaction with different assignments. There are different means to learn and to meet different needs, it is necessary to have several types of assignments. For example several SSS students liked quizzes and mentioned that they help to keep focus while watching the lectures. The finding is contradictory to some previous literature (Davidson & Waddington 2010) where quizzes are blamed frustrating. On the other hand, SSS quizzes were evaluated technically more positively than pedagogically/content-wise unlike other assignments and this well illustrates the nature

of this automatic assignment. The quizzes are practical for both, teachers and students, but they should be used carefully. In other words, questions should measure key issues instead of details that are hard to find, not too many quizzes should be included and settings should be revised so that the quiz answers are available for the students after the quiz deadline. In SSS version 2 one assignment, fertilizer plan, was replaced by a quiz. This affected open feedback. In version 1 the variety of the assignments was acknowledged, while in version 2 (2009-10) this comment didn't occur any more. The fertilizer plan assignment had different approach, calculus that is, than other assignments and it was removed because it was found (too) challenging for the students. It is advisable to return it since challenging assignments (Davidson & Waddington 2010) as well as variety in assignments (Sun *et al.* 2008) are recommended.

Written assignment "Memories of sanitation" was acknowledged for reminding of the students' family history. According to Tapanes *et al.* (2009), the assignments regarding students own background are recommendable in multicultural e-Learning courses. It is also advisable to make cultural differences visible by telling the students in the beginning of the course about expectations regarding assignments and participation, that possibly differ from those in students' home HEI's. (Tapanes *et al.* 2009.) SSS could be improved by instructing more clearly what is expected in assignments and what are the grounds for evaluation. Students also would have liked to receive more feedback from the teachers. In structured questions, the most advanced students evaluated the course staff and instructions more positively than less advanced students. Therefore it is likely that those asking for more instructions in open feedback are less advanced students. This finding fits into several other results as well – advanced students can gain from given materials without further support while less advanced students need support from teachers as well as from other students. However, clear instructions are also beneficial for the advanced students, if they enhance and motivate the whole learning community and decrease low quality contribution.

Realization of all the improvement ideas – increased tutoring and feedback, new type of assignments, better instructions – requires resources in teaching. According to Portimojärvi & Rantala (2010), creation and management of meaningful learning environments require much more work than traditional courses. Also Anderson (2004) has mentioned that a danger in assessment-centered online learning environment is increased workload of the teachers. Anderson (2004) called for assignments with minimal direct impact on teacher workload are urgently needed. The tools proposed by Anderson (2004) are presented in Chapter 2 and some of them are technical promises that have not been fulfilled yet, but few interesting tools were also listed. Collaborative learning environments that students create to document and assess their own learning and student agents who informally facilitate and monitor peer activities (Anderson 2002) could be implemented in SSS. The first one could e.g. be a wiki library that is constructed by the students first year and improved/extended by the students in following year. This type of assignment would allow the students not to start from blank but to use existing knowledge and aim even higher. Student agents who informally

facilitate and monitor peer activities is a tempting idea and could be realized e.g. by asking volunteers and offer the more credit points for additional work.

5.1.4 Technical Design and Tutoring

Sun *et al.* (2008) raised technical design as one of the key factors affecting student satisfaction in e-Learning environment. The technical design of SSS version 2 was based on Moodle learning environment and videos were in Flash video format. Version 1 was based on A&O learning environment and smi-video format. In the recent SSS feedback (version 2) technical design was evaluated similarly, in other words positively, as other factors of the course. Technical design did not emerge in negative open feedback. In positive open feedback weekly assignments and video lectures were acknowledged, but mainly for their content. Technical design was mainly ignored by the students of the version 2. One exception was quizzes, which are technically sound but pedagogically demanding as explained above. Earlier (version 1) technical problems regarding especially video lectures occurred. It looks like SSS is currently in technically stable stage, where technical design is advanced enough to run smoothly and conventional enough not only to run smoothly but also to be invisible. The usage of the very latest technology would probably have brought out more discussion regarding technical choices. Surprisingly the technical design meets currently the needs of the students also in remote areas.

The stable state is not permanent. Situation was improved in 2009 by introducing new software, which seems to work with the current equipment of the students. But ICT is developed constantly and it is important for the course organizer to stay updated. Ideal e-Learning tools are said to be those in line with the tools students use in their everyday life. These tools include blogs, wikis, MSN, Skype, Google Docs, Facebook, among others. However, SSS students have not asked for these new tools and they are quite content with the current, less flexible tools. Portimojärvi & Rantala (2010) have reported successful use of "oldfashionable" e-Learning tools – Moodle course platform, online lectures with Adobe Connect Pro – together with new web 2.0 tool weblogging. Their study together with the findings of this study suggest that it is rather the usage of the tools than the tools themselves that matter. In other words students can accept inflexible interface of Moodle platform if it is used in meaningful way.

One aspect to the adaptation of the latest e-Learning tools is the teachers' IT skills. When more sophisticated learning tools are developed, more technical knowledge is needed and teacher is necessarily not able to take care of the learning environment himself or plenty of time to learn new technologies is needed. Technical design can be partly outsourced or e-Teaching support of TUT can be used to help teachers to manage also the new tools themselves. Recourses used for course development and technical design would probably pay themselves back during the course by decreased teacher workload and improved learning outcomes. In summary, it is advisable to be open to the new e-Learning tools recommended by other course organizers and supported by TUT,

but too much enthusiasm about new technology that might turn out to be false step should be avoided. One good practice that could be taken into use in SSS is blogging described and recommended Portimojärvi & Rantala (2010) in the next quotation.

"For keeping all the blogs in control, a small hack was needed. The RSS-feeds from all the blogs were first collected to the teachers' RSS-reader (Google Reader), which aggregated them into a single blogroll with post titles and source information. This blogroll was then inserted into the front page of the Moodle platform. The result from this was a constantly updating list of the students' blog titles, which also made the Moodle alive and interesting to the students."

According to Sun *et al.* (2008), student computer anxiety affects on learner satisfaction in online learning environment and supporting students with the e-learning tools can enhance satisfaction. Also the teacher attitudes toward online courses affect on learner satisfaction (Sun *et al.* 2008). In the case of SSS not only technical design but also attitudes and skills of both, students and teachers/tutors, support online learning. The course staff has been active in online education ever since the ICT has allowed it and they are not "forced" to teach online, which could be less fruitful situation. Among SSS students there are also those who are suspicious towards e-Learning, but they often like interaction, which makes the course livelier. One of the findings of Sun *et al.* (2008) – students should be helped to build their confidence in using computers and teachers should be trained in e-Teaching – is not applicable to SSS at least urgently. At the moment both, teachers and students have high level skills and technical support is available, but it is good to keep in mind in the long run that further training in e.g. tools and pedagogy could be useful.

Apart from the right tools and meaningful use of them, also tutoring is found to improve the acceptance of the technical design. The structured question *the course staff was* was answerer the most positively of all. The students acknowledged teachers'/tutors' respective attitude towards students as well as help received when solving technical problems. This tutoring dialogue has also served course organizers exposing the current technical problems and suggesting development actions needed. Also Hatfield (1997) has seen the one possibility of the Internet as an educational tool to be facilitated instructors' responsiveness to student needs. So far the common practice in SSS course has been to answer student's questions *via* e-mail and to copy the same answer to Moodle if it is likely that the other students have similar problems. In a course "Mathematic clinic" in TUT the instructions were given in more interactive way. There was an anonymous question forum where students could make questions and either students or tutors can answer with their name. This makes information available for all the students and possibly decreases tutoring work, if students answer to each others question or at least tutor answers one question only once. This practice also supports students who tend to struggle with the computer by themselves without contacting tutors. The question forum of Mathematic Clinic was realized using the social media

site "TTY-piiri". According to Lindfors (2010) it is recommendable to support students with e-learning tools even if they don't ask for help. In other words, formal instructions and messages are needed in addition to the question forum.

"Formal tutoring" or course instructions were evaluated almost as good as the course staff. In open feedback it was discovered that the general course instructions were excellent while assignment instructions could still be improved as explained earlier. General course instructions were well prepared for several reasons. First of all, the course has been developed partly with external funding and already for finance applications the course goals and program have been planned and reasoned carefully. In addition, there have been intentions to start research regarding e-Learning in the Environmental Engineering and Biotechnology Laboratory for ten years and SSS has been presented in several seminars. The last reason for polished course instructions is marketing of the online course to the students of other HEI's as well as DT conference participants.

When SSS e-Learning tools were looked in detail, few especially satisfactory issues as well as few improvement points were found. First of all, it is important to offer materials in different technical formats. Most students preferred video lectures, but there were some who for several reasons such as poor Internet connection or lack of time preferred videos with just sound or simply lecture slides. Some students also evaluated (some) video lectures too long. Possibility to choose is part of online course flexibility that attracts students. According to the open feedback, the video lectures are one of the best parts of the course, but again mostly because of their content. When reading materials and video lectures were compared, it is discovered that in structured questions the students evaluate video lectures harder. Since their content is so appreciated, it is likely that technical challenges such as missing software cause trouble and had an effect on evaluation. Therefore light and robust video technology that opens with "every computer and software" should be sought. In addition some students suggested technical solutions that facilitate communication in the virtual learning environment.

5.1.5 International Learning Community

International learning community including students with different educational, professional and cultural backgrounds and active interaction within the community are undoubtedly among the most important success factors of the course. Interdisciplinary group of lecturers from all over the world further supports the international atmosphere of the course. Success of the learning community is in accordance with a study of Hatfield (1997) that addresses Internet's possibility to increase professional linkages of students and professionals and with the study of Rizvi (2001, according to Coryell *et al.* 2010), which presents that internationalization requires higher education to design opportunities which focus on skills needed to develop a global imagination. The SSS course responses to a TUT (2011) Plan for Internationalization 2011 goal of creating more international and multicultural learning environment at the University.

As mentioned earlier, it is important to define the target group of the course. It is useful to ask whether the course should be adapted to the need of everyone or should the participation be restricted instead. In the light of the results of this study, the answer is both. While heterogeneity in terms of different educational, professional and cultural backgrounds is great advantage, heterogeneity in the level of education (bachelor, master or PhD student) and motivation to study is a challenge. As presented earlier in the context of assignments, students' contribution to the community as well as their gaining from it varies. The course organizer has two challenges: Firstly the highly motivated students should be selected to the course and secondly the students' motivation should be sustained and even increased during the course. The course can be passed without great background knowledge, but learning community is harmed if students don't have experiences and knowledge to share and if they comment just because they have to.

The situation could be improved by setting bachelor degree as course requirement. Also enhanced university exchange arrangements would improve the target group reaching. First of all, there should be right level and content courses available for ERASMUS students. Secondly, if virtual exchange was established, SSS could be offered to more universities. So far the unique learning community has been enabled by the course coordinator relationships with the teachers of other HEIs. Students of these unofficial partner universities have participated on the course. If virtual exchange would have an official role, more advanced students interested in safe and sustainable sanitation could be reached and peer work would be enhanced.

The learning community success depends not only on reaching the right target group. Aspects of ICT and learning tasks including collaboration are discussed in detail earlier. Also tutoring is discussed from several viewpoints already, but there are still some new ideas left for tutoring that aims at learning community creation. According to Tapanes *et al.* (2009), students coming from different educational cultures than the course organizer institute felt less motivated to participate partly because of their cultural backgrounds and partly because of language barrier. This could be valid also in the context of SSS where different – e.g. polite and critical – manners to take part in discussions were observed. Students used to polite discussions might end up offended and critical students might interpret politeness as empty or tri*via*l and get frustrated. In both cases motivation to participate can be decreased. According to Tapanes *et al.* (2009) in multicultural e-Learning environments students should be offered advice on what they will see and experience during the course as well as instructions about participation. Study of Tapanes *et al.* (2009) was carried out in the U.S. where local students not only know the educational culture but also master the language used in the online course. The situation is more equal when the organizer is Finnish and local students have to struggle with the language just like most of the visiting students and also teachers speak their second language. Use of imperfect language can facilitate the participation, but also lead to misunderstanding in learning community.

Meeting in person would assist in creating the learning community. Unfortunately personal meeting is impossible in the case of SSS. However, in conference years there has been an intensive workshop where sanitation researchers and professionals have met in person. Many workshop participants have also taken the online course starting right after the conference even though it has equal content as the workshop. The student satisfaction in 2009 differs slightly from that in 2010 even thought the course materials and implementation were identical. In 2009, students evaluated course in general, course structure, learning materials, quizzes, group work and discussions more positively than the students in 2010. The positive evaluation could be due to meeting other students as well as teachers in person in the workshop. In conference years some critical evaluations have also emerged. In 2009, students preferred other lecture formats than videos more often than in 2010, which might be due to remote location and varying Internet connections. Students also faced more difficulties in finding the group in 2009 than 2010. This result is contradictory to the idea of better learning community formation in 2009, but on the other hand TUT students were not in the workshop and there might have been difficulties to form groups within very heterogeneous group. As explained earlier, in conference year course workload and deadlines were also evaluated to be hard and tight more often than in 2010. Since the heterogeneous learning community is in the interest of the organizer, the varying needs of the students should be taken into account whenever possible. Clear instructions and tutoring are again in key position. Also new ways for group formation could be sought.

5.2 Systematic online course development

5.2.1 Institutionalization

Virtualization of the universities and knowledge centre networking has been expected since mid-nineties, but has still not really happened (Szucs 2009). Also SSS organizers have been expecting online courses to become mainstream in HEI's for ten years. In reality, virtual exchange is still based on informal agreements and virtual mobility is still one-way, partner universities don't offer online courses in exchange for SSS. The course organizer offers the course for free and does not receive official recognition such as credit points in the TUT register or money for it. However, the overall benefits are more complicated to evaluate. Taking visiting students to the course can be seen as benchmarking, which enhances the course organizer's reputation related to the organiser's knowledge in sustainable sanitation as well as achievements in online teaching. Interdisciplinary and multicultural learning community is valuable for the course as explained earlier. Even though the partner universities have not offered whole online courses for TUT students, they still have contributed on teaching. Head of Degree Programme Eeva-Liisa Viskari (Environmental Engineering, Tampere University of Applied Sciences) has given an online lecture for the course versions 1

and 2. For the SSS version 3 (2011) Professor Thomas H. Hatfield (Department of Environmental and Occupational Health, California State University Northridge CSUN) who is also an adjunct professor of TUT is going to produce an online lecture. His students have not taken the course yet, but they have been invited. Professor Gina S. Itchon (College of Public Health University of the Philippines, Manila) studied in the course version 1 and was teaching in the version 2. And so on.

Cooperation network based on personal contacts of the course organizer allows selecting cooperation partners, but on the other hand leaves many partners outside. When cooperation is informal, online teaching is invisible for TUT and resources are not allocated according to the workload. Informal arrangements also require administrative work from the course organizer.

Reaching students of different HEI's is currently random and exchange arrangements are confusing. The course organizer policy has been to take all the HEI students to the course without official agreements, but this is not announced in any study guide, because official practices are different - Open University and Flexible Study Rights Agreement JOO in Finland – or they are unclear or not existing as in the case of cross border exchange. Finnish students can use official routes, but they are not systematically advised to do so. Potential visiting students can't find the course program anywhere nor are they told how to enroll to the course and how the credit transfer is handled. The guidance is weak partly because the course organizer considers JOO too heavy and doesn't quite know how enrollments or credit transfer should be handled. Even though JOO is heavy, it is the best system currently available and it would free the course organizer from administrative work and allow credit point registration. In addition JOO agreement and JOO study guide could be channels to put virtual campus of environmental engineering into practice, if Finnish HEI's would take it into wider use. One of the obstacles of a JOO agreement implication is said to be the lack of virtual course supply (Finnish Virtual University 2006). In order to clarify virtual exchange practices within Finland, SSS is introduced in the next JOO and Open University study guides (2011-12) and it will be seen how many students find the course that way. Also unofficial arrangements are still in use and especially students from the organizations that contribute on teaching are taken to the course without official agreements.

Cross border virtual exchange is a more difficult problem to solve. If the course organizer would emphasize official recognition, it would probably be possible to formulate "Virtual exchange contract" and ask those in charge of physical exchange in TUT and partner universities to sign it. The contract would possibly allow student enrollments and credit point registration in TUT register the same way than ERASMUS and other exchange administration works today. REVE (2007) encourages course organizers to be active in sorting out the practices with their home institutions. However, it is laborious enough to organize such a course and instead of more forerunning work, the course organizer needs support from TUT and higher education politics. Unfortunately, the support is not foreseen in the near future. In the TUT International Plan (TUT 2011) aspect of e-Learning is nearly ignored. International

online courses are mentioned in the plan as one way of internationalization from home, but any practices to establish online exchange studies such as agreement on the university level are not mentioned.

Virtual exchange establishment is not a straight forward process and maybe TUT is not the right organization to solve it. But the task is necessary to tackle. Today's students are expected to study fast and they can't necessarily invest the time to study abroad. On the other hand, university graduates are expected to have skills needed in international work life. Coryell *et al.* (2010) argue that abroad studies and international experiences cannot be the main focuses of higher education internationalization. Alternative methods to internationalize the learning experiences at home are needed for those who cannot afford the financial cost or time to study abroad. (Coryell *et al.* 2010.) SSS has been acknowledged by students for offering international atmosphere. One interesting point in the Plan for Internationalization (TUT 2011) is that the TUT students of biotechnology study abroad more seldom than the students of the other degree programs. The students of biotechnology often take the course SSS and for them it might form a significant international component of their studies. Improved online course participation and virtual exchange arrangements would further enhance possibilities for home internationalization. Based on the Internationalization Plan (2011) it seems that the possibilities of e-Learning are not fully understood in TUT. Maybe the course organizer should highlight the international aspect of the SSS to the persons in charge of exchange arrangements and internationalization in TUT, because according to Coryell *et al.* (2010) the concept of internationalization needs to be commonly understood across the institution before it can be operationalized across academic programs and administrative functions.

While waiting for official recognition of virtual exchange studies, the course organizer needs to look for other practices of cooperation. Recent step towards a more official virtual exchange is the cooperation with the Finnish University Partnership for International Development (UniPID). From 2011 SSS is a part of UniPID minor programme in development studies. Universities take care of the online courses and UniPID supports universities with practical matters and administration, e.g. marketing, enrollments and credit transfer. The most important advantage of the network is that it puts online course supplies of different universities together. For the first time environmental engineering students of TUT have a list of online courses that they can take from other Finnish universities. When the aim is to keep SSS as an advanced level course, UniPID type of cooperation could be the right way to progress. Other Finnish networks of the field of science - environmental engineering, sanitation, water etc. - could be approached. Similar cross border activities would face more difficulties in student enrollments and credit point registration, but cooperation is still possible and recommendable. The course organizer has done fruitful cooperation with the Finnish Doctoral Program in Environmental Science and Technology (EnSTe) and its cooperating international doctoral schools GESS (Graduate School in Environmental Stress studies) and SENSE (Socio-Economic and Natural Sciences of the Environment).

In summary, networks of virtual studies should be sought in order to cooperate in teaching and administration, but if administrative cooperation is too challenging, teaching cooperation is an adequate start.

One possible direction to develop the online course cooperation is the development cooperation. The reaching of course target groups in developed countries is limited by ICT. According to Castells (2000, according to Marginson 2010) it is the inclusion and exclusion in relation to knowledge and ICT networks that divide the global world. SSS has information useful for improving sanitation situation there were it is the poorest, in developing countries, but those tend to be also the locations where the Internet accessibility is the most limited. It is assumed that universities all over the world have acceptable connection to the Internet, but e.g. professionals with university degree working in remote sanitation projects might have a rather limited virtual mobility from their homes and offices. However, they are the people who gain directly the most from the course content and who would also have valuable information to share in the learning community. Need for training of the professionals emerges in the results of this study. Sanitation professionals are the most content student group and in the open feedback "Safe and Sustainable Sanitation Society", where students and professionals could meet and change ideas also after the course was sketched. TUT Moodle is not the right place for such a society, but the idea can be adopted if the development cooperation is developed further with partner organizations.

The capacity of SSS in development cooperation could be improved by using it in centralized sanitation professionals training. A group of sanitation professionals could be trained e.g. in a local university, where SSS online material could be used and local teacher/tutors could lead the activities. This kind of cooperation can be based on personal contacts of teachers, tutors or students. Another option is the Higher Education Institutions Institutional Cooperation Instrument (HEI ICI) that supports collaboration projects between higher education institutions in Finland and developing countries. The programme is funded by the Ministry for Foreign Affairs of Finland and the Centre for International Mobility CIMO in Finland is in charge of the administration. (CIMO 2011.) The Future Learning Finland project aims at exporting Finnish education (FinPro 2010) and TUT possibly takes part on the project in the future. Current cooperation partner institutions include Stockholm Environment Institute (SEI) and Wetsus, centre of excellence for sustainable water technology. In DT 2012 conference, development cooperation possibilities could be further determined.

Even though online course cooperation is challenging and practices are under development, the cooperation is essential for the SSS quality. In addition to international learning community, also visiting video lecturers are behind the course success. As explained earlier, maintaining successful e-Learning environment requires plenty of work and splitting this work between HEI's is a great benefit. In addition to current practices sharing of teaching materials and joint courses that involve teachers form more than one HEI are possible.

Finally, the experiences of the SSS organizer are compared to the current trends of higher education globalization. According to Wende (2009) current trends in European higher education are both convergence, aiming for transparency and harmonization; and divergence, aiming for more diversity. SSS would benefit from transparency and harmonization, if they lead to an established system of virtual exchange. If universities become more specialized, need for cooperation and sharing the knowledge is emphasized. According to Marginson (2010) national regulatory reach is inadequate in cross border activities and the same institutions operate as public providers at home and as private entities abroad. Virtual exchange, taking place in SSS, could be realized according the established agreements within Finland, but not when visiting students come from abroad. Virtual exchange seems to be double or triple marginalized. First of all, virtual studies are not considered as official as classroom studies in TUT, secondly JOO system within Finland is criticized by HEI's and when virtual exchange studies are realized in loosely controlled international higher education environment, everything depends on the course organizer.

The dilemma of virtual exchange is fascinating but too wide to solve within a thesis. The course development is an easy starting point for tackling with virtual exchange establishment. While internationalization and virtual exchange are the questions of the university and even wider higher education politics, polishing up the course ready for virtual exchange is a task of one institute. In addition, while university support for virtual exchange seems complicated, help for e-learning tools is easily available from the TUT e-Teaching support. However, future research should find ways to establish online education and especially virtual course exchange in the field of environmental engineering. Formal agreements would help the department to find the right partners and facilitate an access of the students to high level courses.

5.2.2 Collection and usage of student feedback

According to Jara & Mellar (2010) course teams need to address the quantity and quality of the student feedback as well as to ensure that the data collected is analyzed and acted upon. SSS response rates are high, but quality of the data needs to be considered. When SSS is considered, the most useful feedback was collected by open questions as seen in the Chapter 4. Answers to the open questions were often thoughtful. In structure questions right questions and answer choices need to be know beforehand, which is challenging (Routio 2007). In addition, structured questions are too easy to answer and some respondents might fill them not very thoughtfully, which decreases feedback quality. Different people also have different ways of giving feedback depending on their cultural background and personality. For a polite student *excellent* is a typical choice while a more critical student can choose *good*, even if both were equally content.

To improve the questionnaire, shortening and clarifying it is recommendable. Some questions are unclear and overlapping and therefore the explaining value of the answers is somewhat low. For example, in the version 1 the students were asked *Video*

lectures were..., *Did you have problems with the video lectures? What kind of problems?* and *Reading materials were....* The change made to these questions in 2009 was not successful. Since then the students have been asked *Video lectures were...*, *Technical form of the videos was...*, *I preferred (videos with picture, videos with sound, lecture slides)* and *Material provided was....* Questions regarding video lectures are overlapping and it is unclear whether respondents evaluated technical form of the videos in one, two or three questions, especially when they were not one after another in the query form. Material provided could refer to reading material or all learning material including video lectures, which would make it the forth question measuring satisfaction with the video lectures.

To evaluate learning materials, it is suggested to include only the questions *Reading materials were* and Video *lectures were* in the questionnaire. Rest of the question regarding learning materials could be removed and let the student tell other issues such as technical problems, if they are relevant, when answering the open questions. The questionnaire could also be clarified by adding subtitles *Learning materials* and *Assignments*. After these changes it would be easier to compare different learning materials as well as assignments. Of course, technical issues are important as well, but they are often reported and even fixed already during the course. As reported earlier, from the questions *Workload was* and *Deadlines were* the answer choice *Fair* was missing. The whole proposal for a new questionnaire is in Appendix 5.

Apart from modifying questionnaire at the end of the course, new feedback collection practices could be taken into use. More qualitative and dialogic methods recommended in literature (Jara & Mellar 2010) include evaluation tasks that are embedded as part of online course assignments to encourage students to reflect their own learning. Reflection already takes place in SSS assignment when students peer review each others work and especially when they respond to the review and answers of the other students. However, this process has not been connected to feedback collection and possibilities for it could be considered. It is seen in SSS feedback collection that learning and giving feedback are closely related. While giving feedback, some students became inspired to reflect their learning process. According to Jara & Mellar (2010) tutors' close relationships with their students could be explored further as a mean of gathering feedback. This approach has been in use in this research as explained in Chapter 3. Further development of joined tutoring and feedback gathering could include systematic storage of student messages and solved or unsolved problem situations.

During the analysis the quality of feedback and importance of different feedback occurred. Should the feedback on students with high/low learning outcomes or motivation be considered equally important? Probably it is possible to improve the course to meet the need of different students and therefore increase the motivation of some students. It is also possible that some students simply are not motivated to study and no matter what the teacher does, they won't improve their performance. It is also possible that the course can be however bad, and the most motivated students still learn. It is easy to find the main factors affecting the student satisfaction from the data. What

is more difficult is to know what is the meaning of the comments that occur very seldom in the data. It is hard to decide, whether they should be taken into consideration or do they just make the feedback too complicated and hide the more important issues. Typically, these comments are also contradictory. For example, some students have revealed with the fact that the teachers didn't speak perfect English either, while others were annoyed by bad English so much that they could not watch the lectures. In this research nearly all feedback was presented, which made the analysis a bit complicated.

Student feedback has been read through from Moodle yearly after the course, but it has not been processed and used systematically. According to Jara & Mellar (2010) to guarantee the use of data collected, course leaders need to explicitly assign responsibilities for quality assurance. Based on this thesis the following procedure is recommended. After each course implementation a simple qualitative analysis should be performed in addition to the statistical analysis offered by Moodle. As mentioned earlier that analysis has its limitations, but it is easy to use and therefore more recommendable than more complicated tools. A qualitative analysis can be similar to this study. That method is explained in the Chapter 3. Other methods can be applied as well, but it is important to go through the open feedback systematically, compare it to the earlier feedback and construct a list of recommendations similar to that in the next chapter. The feedback gathered with the new methods (assignments and tutoring) should also be included to the recommendations list. Every year before the course starts and especially when it is updated, everyone participating on the course delivery should have a meeting where the recommendations list is studied and actions are decided.

6 RECOMMENDATIONS

The following TO DO -list is based on student feedback and literature findings.

Development proposals related to the course content
• Issues that could be added to the content include:
1) Information of existing and under development DT and other (not-dry) SSS technologies 2) Aspect of safe water supply 3) SSS in developed countries 4) Practical information of how the whole cycle from toilet to field (and plate) can be handled in safe and acceptable way.
• *Module 2 History of Sanitation* should be renewed.
• The course handles wide range of issues in general level. It would be beneficial to go deeper into the most important topics. Also time allocation should be revised in order to use enough time on key issues and handle supporting issues more lightly.
• Student background should be taken into consideration when developing the course. To whom is the course aimed and what is the background knowledge which the course content can be connected to?

Development proposals related to the online course flexibility
• All the materials should be available to the students already in the beginning of the course.
• Equilibrium between freedom and participation on online community should be sought.
• Instructions regarding workload and freedom of online studies should be improved.
• Possibilities to download and watch video lectures on mobile devices should be considered.

Development proposals related to the diversity in assignments
• Assignment instructions should be clarified and grounds for evaluation should be made visible.
• More time could be given for sanitation plan group assignment. Group formation and commenting order made by teachers as well as a possibility to choose individual/group work could be weighted up. Existing group work assignments could be extended.
• Quiz answers should be available for the students. The questions 5 and 6 in the quiz "Some questions about sanitation under Stress" should be clarified. When the course is extended in 2012 more quizzes should not be added.

• When the assignments include peer discussion, teachers should take part on the discussions in order to clarify misunderstandings and provide relevant information. The students are encouraged to share private experiences of e.g. DT technologies and this know-how is not necessarily relevant when solving large scale sanitation problems.

• Different learning styles and different needs of the students should be considered and wide variety of assignments should be offered. Linkage between learning materials and assignments should be strong. Ideas for new assignments include a problem solving group work based on design and site assessment and a wiki, which could be based on previous years work and extended/updated yearly. Suitable topic for the wiki is introduction of sustainable sanitation techniques. In addition, old fertilizer plan from SSS version 2 could be reintroduced. To make assignments livelier, real pictures could be posted to Moodle. New assignments should be planned keeping in mind both, pedagogical aspect and impact on teachers workload.

Development proposals related to technical design and tutoring

• It is advisable to be open to new e-Learning tools recommended by other course organizers and supported by TUT, but too forerunning steps in technical design should be avoided. The organizer should keep up with the best available video technique with each passing year. Blogging could be tried as a new e-Learning tool.

• Tutoring is important in all stages of the course: assignments, technology and learning community formation. To maximize tutoring efficiency (anonymous) forum where students can ask questions and students/teachers can answer them could be added. Volunteer student agents could be "hired" to do part of the tutoring.

Development proposals related to the learning community

• Instructions and tutoring regarding online course practices and expectations in the beginning of the course should be improved in order to facilitate learning community formation and participation of students with different cultural and educational backgrounds.

• Bachelor degree could be set as a course requirement.

• Official recognition of the virtual exchange would facilitate the reaching of the course target group and guarantee the international atmosphere of the course.

Development proposals related to institutionalization

• JOO agreement could be taken into use as a channel of announcing the course to the potential Finnish students (JOO study guide) and as an official system of student administration.

• To establish cross border virtual exchange, the support from TUT, Finnish higher education politics, EU... is needed. Those in charge of exchange arrangements and internationalization in TUT can be reminded about missing agreements. Future research could focus on establishing online education and especially on virtual course exchange in the field of environmental engineering.

• Networks of the field of environmental engineering could be approached in order to join a virtual campus.

• Development cooperation and training of the trainees could be considered. One possibility is The Higher Education Institutions Institutional Cooperation Instrument (HEI ICI).

• Sharing the work between HEI's could be improved by shared teaching materials and joint courses.

Development proposals related to the collection and usage of the student feedback

• The questionnaire should be shortened and clarified as shown in the Appendix 5.

• New feedback collection practices could be taken into use. They include assignments that require self reflection and systematic listing of situations faced and solved in tutor-student interaction.

• The course team (tutor) should construct a list of recommendations after each course implementation. To make the list clearer, contradictory and isolated comments can be ignored if there is no special reason to take them seriously. Every year before the course starts and especially when it is updated, the whole course team should have a meeting where the recommendations list is studied and actions are decided.

The recommendations should be taken into consideration to the appropriate extent when the course is organized for the next time and when the next course versions are developed.

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APPENDIX 1: COURSE PROGRAMME 2006-08

TAMPERE UNIVERSITY OF TECHNOLOGY

EnSTe - Finnish Graduate School in Environmental Science and Technology

Safe and Sustainable Sanitation
Internet course, 3 credits
4.9.- 30.10.2006

Target group: Advanced M.Sc students, Ph.D students and post docs from Finnish and international universities, EnSTe and its partner graduate schools, UNESCO, RC....

Organizer: Institute of Environmental Engineering and Biotechnology
Tampere University of Technology (TUT), Finland

Persons in charge:
Professor Tuula Tuhkanen, Lecturer Outi Kaarela, and Researcher Sannamari Hellman

Visiting experts:
- Dr-Ing./Vice Director Joachim Behrendt, Hamburg University of Technology, Institute of municipal and Industrial Waste water management, focus on Ecological Sanitation
- Dr Eeva-Liisa Viskari, Senior Lecturer, Tampere Polytechnic University of Applied Sciences
- M.Sc (Civ.Eng.) Researcher Sanna-Leena Rautanen, TUT
- M.Sc (Civ. Eng.)Ms.Sc (Economics); Researcher Eija Vinnari, TUT
- Dr Petri Juuti, Senior Researcher, University of Tampere
- Päivi Uusihonko, Public Health Nurse (Finnish Red Cross/ Tampere Municipality)
- Dr Andreas G. Koestler (Norwegian RC)

Course arrangements
Safe and sustainable sanitation (SSS) internet course is a distance learning course. The course will be using an A&O learning environment, which is accessible only for accepted students and teachers. Following the course requires a computer with a relatively fast internet connection, a sound card, speakers, and freely available RealPlayer and Adobe Acrobat Reader programs.

Course is divided into 7 sections each lasting for a week. Each section consists of a video lecture and/or reading material and a weekly assignment. Successful completion of the weekly assignments is required to receive credits for the course. In addition, the participants are encouraged to post comments on the course topics at the discussion groups.

Grading scale is the following:

Grade		% from total points
Excellent	5	90-100
Very good	4	80-89
Good	3	70-79
Fair	2	60-69
Passed	1	50-59
Fail	0	0-49

To complete the course, participants should receive at least the grade "passed" for all the assignments.

Registration and further information

For further information and registration please contact Sannamari Hellman, sannamari.hellman@tut.fi. *The registration deadline is 31.8. 2006.*

TAMPERE UNIVERSITY OF TECHNOLOGY

EnSTe - Finnish Graduate School in
Environmental Science and Technology

PRELIMINARY COURSE PROGRAM in 2006

Week 36	Introduction to the course and safe and sustainable sanitation
Study material	Video lecture: Welcome to the course
	Professor Tuula Tuhkanen, Tampere University of Technology, Finland
	Video lecture: Definition of sustainable sanitation
	Professor Tuula Tuhkanen, Tampere University of Technology, Finland
Assignment	Greeting message to course discussion group and short writing
Week 37	History of sanitation
Study material	Video lecture: A Brief History of Sanitation in Finland
	Dr.Petri Juuti, University of Tampere, Finland
	Reading material: selected parts of Brief History of Wells and Toilets
	(Juuti & Wallenius 2005, available: http://tampub.uta.fi/index.php?tiedot=79)
Assignment	Reading material and short writing with discussion
Week 38	Health and Safety
Study material	Video lecture: Risks related to reuse of excreta and water
	Prof. Tuula Tuhkanen, TUT
	Video lecture: Sanitation in extreme conditions
	Dr Andreas Koestler / Norwegian RC
	Slide show by Public Heath Nurse Päivi Uusihonko: Heath, sanitation and water in post-earthquake situation in Pakistan 2006
	Additional reading:
	Chapter 7. Microbial aspects. In WHO Guidelines for Drinking-water Quality.(http://www.who.int/water_sanitation_health/dwq/gdwq3_7.pdf)
	Statistics: http://www.who.int/whr/2004
Assignment	Quiz or other assignment
Week 39	Technological solutions of sustainable sanitation
Study material	Video lecture: Drivers and pressures/ techniques of ecological sanitation Prof. Dr. Joachim Behrendt, Hamburg University of Technology, Germany
Assignment	Sanitation options in different conditions (group work)
Week 40	Closing the loop
Study material	Sanitation ecology. Reuse of nutrients Dr. Eeva-Liisa Viskari, Tampere Polytechnic University of Applied Sciences, Finland
Assignment	To be decided later
Week 41	Fall break
Week 42	Acceptability of sanitation
Study material	Video lecture: Sanitation, poverty and gender Sanna-Leena Rautanen, Researcher, TUT
Assignment	Group work "Problem Tree"
Week 43	Affordability of sanitation
Study material	Video lecture: Affordability of water and sanitation Eija Vinnari, Researcher, TUT
Assignment	Group work continues: Estimating costs of sustainable sanitation alternatives

There is no course fee!

APPENDIX 2: COURSE PROGRAMME 2009-10

TAMPERE UNIVERSITY OF TECHNOLOGY

Environmental Engineering and Biotechnology Laboratory

Safe and Sustainable Sanitation

Safe and Sustainable Sanitation
Internet course (3 ECTS credits) 31.8.-26.10.2009

Target group
Advanced M.Sc students, Ph.D students and post docs from Finnish and international universities and non-academic sanitation professionals.

Organizer
Environmental Engineering and Biotechnology Laboratory,
Tampere University of Technology (TUT), Finland

Persons in charge
Professor Tuula Tuhkanen

Visiting experts
Dr. Petri Juuti, Senior Researcher, University of Tampere, Finland
MD Heikki S. Vuorinen, adjunct professor (docent) in history of medicine, University of Tampere and University of Helsinki.
Associate Professor Gina S Itchon, Department of Preventive and Community Medicine, Head of the Research Unit, Jose P Rizal School of Medicine, Xavier University, Philippines
Dr. Andreas G. Koestler, Fontes Foundation, Norway
Professor Blanca Jiménez, National Autonomous University of Mexico (UNAM)
Dr. Eeva-Liisa Viskari, Senior Lecturer, TAMK University of Applied Sciences, Finland
Professor Joachim Behrendt, Hamburg University of Technology, Institute of municipal and Industrial Waste water management with the focus on Ecological Sanitation
M.Sc (Civ.Eng.) Sanna-Leena Rautanen, Researcher, Tampere University of Technology, Finland & Finnish Consulting Group, Rural Village Water Resources Management project, Nepal
Kalawati Pokharel, Health & Sanitation Specialist, Rural Village Water Resources Management Project, Nepal
Dr. Claudia Wendland, Women in Europe for a Common Future, Germany
Delegations from Sambia, Nepal and Ethiopia

TAMPERE UNIVERSITY OF TECHNOLOGY

Environmental Engineering and Biotechnology Laboratory

Safe and Sustainable Sanitation

Preliminary course program 2009

1 Introduction to the course and safe and sustainable sanitation (week 36)
Welcome and introduction to the course
Definition of safe and sustainable sanitation
Prof. Tuula Tuhkanen, Tampere University of Technology, Finland
Sanitation in extreme conditions
Dr. Andreas Koestler, Fontes Foundation, Norway
2 History of Sanitation (week 37)
History of sanitation in Finland
Dr. Petri Juuti, University of Tampere, Finland
History of sanitation and health
MD Heikki Vuorinen, University of Helsinki and University of Tampere
3 Health and safety (week 38)
Introduction to health and safety issues
Prof. Tuula Tuhkanen, TUT
Risks related to reuse of excreta and water: Sanitation-related diseases in the Philippines and South East Asia
Prof. Gina Itchon, Xavier University, Philippines
4 Re-use of excreta (week 39)
Pathogens of concern in dry toilets from developing countries
Pathogens in dry sanitation system and risk of using sludge produced in agriculture
Prof. Blanca Jiménez, UNAM,Mexico
Sanitation ecology, Reuse of nutrients
Dr. Eeva-Liisa Viskari, TAMK University of Applied Sciences
5 Technological solutions (week 40)
Drivers and pressures/techniques of ecological sanitation
Prof. Joachim Behrendt, Hamburg University of Technology
Finnish dry toilet technique
6 Socio-economic aspects related to dry sanitation (week 41-42)
Opportunities and challenges related to increasing access to sustainable sanitation facilities
Researcher Sanna-Leena Rautanen, TUT & Finnish Consulting Group, Nepal
Kalawati Pokharel, Health & Sanitation Specialist, Nepal
Making sustainable sanitation work for men, women and children - gender aspects and school sanitation
Dr. Claudia Wendland, Women in Europe for a Common Future, Germany
7 Development cooperation (week 43)
First-hand experiences from Nepal, Sambia and Ethiopia

APPENDIX 3: QUESTIONNAIRE 2006-08

1. In general, the course has been..
   a. Excellent
   b. Very good
   c. Good
   d. Fair
   e. Poor
   f. No opinion

2. The video lectures were..
   a. Excellent
   b. Very good
   c. Good
   d. Fair
   e. Poor
   f. No opinion

3. Did you have problems with the video lectures? What kind of problems?

4. The reading material was..
   a. Excellent
   b. Very good
   c. Good
   d. Fair
   e. Poor
   f. No opinion

5. The assignments were..
   a. Excellent
   b. Very good
   c. Good
   d. Fair
   e. Poor
   f. No opinion

6. What did you like the most about this course?

7. What did you most dislike about this course?

8. What changes or ideas you suggest for the course?
Any important topics totally missing?

APPENDIX 4: QUESTIONNAIRE 2009-10

1. The course structure was
   - a. Excellent
   - b. Good
   - c. Not so good
   - d. Bad

2. The video lectures were
   - a. Excellent
   - b. Good
   - c. Not so good
   - d. Bad

3. The quizzes were
   - a. Excellent
   - b. Good
   - c. Not so good
   - d. Bad

4. The discussions were
   - a. Excellent
   - b. Good
   - c. Not so good
   - d. Bad

5. The groupworks were
   - a. Excellent
   - b. Good
   - c. Not so good
   - d. Bad

6. The material provided was
   - a. Excellent
   - b. Good
   - c. Not so good
   - d. Bad

7. The course instructions were
   - a. Excellent
   - b. Good
   - c. Not so good
   - d. Bad

8. The workload was
   - a. Too heavy
   - b. A bit too heavy
   - c. A bit too light
   - d. Too light

9. The deadlines were
   - a. Too tight
   - b. A bit too tight
   - c. A bit too slack
   - d. Too slack

10. The course staff was
   - a. Excellent
   - b. Good
   - c. Not so good
   - d. Bad

11. The technical form of the videos was
   - a. Excellent
   - b. Good
   - c. Not so good
   - d. Bad

12. I preferred
   - a. videos with picture
   - b. videos with just sound
   - c. lecture slides

13. The technical form of the quizzes was
   - a. Excellent
   - b. Good
   - c. Not so good
   - d. Bad

14. The technical form of the discussions was
    a. Excellent
    b. Good
    c. Not so good
    d. Bad

15. The technical form of the groupworks was
    a. Excellent
    b. Good
    c. Not so good
    d. Bad

16. It was easy to find a group
    a. Very easy
    b. Quite easy
    c. Quite difficult
    d. Very difficult

17. I would grade this course as
    a. 5
    b. 4
    c. 3
    d. 2
    e. 1
    f. failed

18. What parts of this course did you especially like?

19. Which parts of this course did you enjoy the least and why?

20. What changes would you make to this course to make it better?

APPENDIX 5: QUESTIONNAIRE 2011

1. The course content was
    a. Excellent
    b. Good
    c. Not so good
    d. Bad
2. The course instructions were
    a. Excellent
    b. Good
    c. Not so good
    d. Bad
3. The course staff was
    a. Excellent
    b. Good
    c. Not so good
    d. Bad
4. The technical design was
    a. Excellent
    b. Good
    c. Not so good
    d. Bad
5. I would grade this course as
    a. 5
    b. 4
    c. 3
    d. 2
    e. 1
    f. failed

Learning materials
6. The video lectures were
    a. Excellent
    b. Good
    c. Not so good
    d. Bad
7. The reading material was
    a. Excellent
    b. Good
    c. Not so good
    d. Bad

Assignments
8. The quizzes were
    a. Excellent
    b. Good
    c. Not so good
    d. Bad
9. The written assignment was
    a. Excellent
    b. Good
    c. Not so good
    d. Bad
10. The discussions were
    a. Excellent
    b. Good
    c. Not so good
    d. Bad
11. The groupworks were
    a. Excellent
    b. Good
    c. Not so good
    d. Bad
12. The workload was
    a. Too heavy
    b. A bit too heavy
    c. appropriate
    d. A bit too light
    e. Too light
13. The deadlines were
    a. Too tight
    b. A bit too tight
    c. Fair
    d. A bit too slack
    e. Too slack

You are free to say what you like
14. What parts of this course did you especially like?
15. Which parts of this course did you enjoy the least and why?
16. What changes would you make to this course to make it better?