

# Networking or going solo? Understanding the Learner's Perspective in the Flexible Learning Environment

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## ABSTRACT

The question we set out to answer is: *How do students in the LUMA-GIS programme go about their learning of GIS?* The research question was approached from a phenomenographic perspective with the intention of generating descriptions and analyses of ways of experiencing the flexibility and the learning that is afforded in the programme. Data sources in this study included in-depth interviews and questionnaires (second-order data) as well as naturalistic data from submitted course work (first-order data). The entire population consisted of one hundred and ten students, who had finished the first course in the programme. Data is analysed and interpreted both from a quantitative and a qualitative perspective. Preliminary analysis of the data shows some interesting differences between students tendency to communicate with others in the course.

## Keywords

CEQ, distance learning, diversity, flexibility, GIS, phenomenography, SOLO-taxonomy.

## BACKGROUND AND INTRODUCTION

Learning Lund is a Centre of Lund University, charged with the task of establishing, supporting and carrying out developmentally-oriented research on and about learning, as it manifests itself in the various enterprises of the university – in relation to teaching, education and research – or in the relationship between the university and the society it serves. One such research project, sponsored by the Swedish National Science Foundation, is *Learning in the ICT-Extended University: Experienced context and constituted meaning in ICT-supported outreach initiatives involving flexibility and diversity*. This paper presents initial finding from one of the three cases involved – LUMA-GIS – the fully internet-based Lund University Masters programme in Geographical Information Systems (GIS). The entire program is given in English and is equivalent to 120 European ECTS credits (two years of fulltime study).

GIS is a tool to capture, store, structure, analyse and visualise geographical data, such as the position of a building on the surface of the earth, and attributes, such as who owns that building. The analysis and visualisation of such data in time and space is one of the most ubiquitous data forms of our time – used for weather maps, archaeology, global economic flows, traffic information and so on. GIS is an efficient tool that, thanks to improved computer power, now is widely available to both professionals, with needs for new competencies, and students whose future work will include GIS. The long-term goal with the LUMA-GIS programme is to provide an international and flexible training for professional GIS users as well as students who are novices. Hence, the GIS education has to be

- multidisciplinary,
- diverse and international, since the need for training is global,
- both theoretical and practical, involving problem solving as well as hands-on training, and
- flexible, so that students can study how, where and when they want.

Since January 2004, the GIS Centre at Lund University offers a two year Masters programme for professionals and traditional students from all over the world, that is free of charge, mediated by the Internet, possible to study at a flexible pace, and optionally worked at individually or in networked cooperation.

## THE STUDY

The Masters programme was designed to be very flexible, not only in terms of starting date, study tempo (25%–50%–100%), study mode (Online–CD-ROM) and material format (text–audio–video–interactive tool) but also in terms of individual choice whether to network or work alone. Students attending the programme come from diverse backgrounds both in terms of nationality, age, gender, family situation, employment, and previous disciplinary studies, and differ also in terms of previous experience of distance learning and access to a computer and Internet connection of some sort.

The question we set out to answer was: *What is the relation between the flexibility-related features of the courses and the learning that is afforded?* Or to put it simply: *How do students in the LUMA-GIS programme go about their learning of GIS?* Learning was here seen as the constitution of meaning in relation to the context of learning that is experienced by the individual. The context of learning is experienced against the backdrop of each individual's own background and previous experiences, in the meeting with the given structure and content of the courses and in the meeting with other participants and teachers at a distance.

The research question was approached from a phenomenographic perspective (Marton, 1981; Svensson, 1984, Marton & Booth, 1997) with the intention of generating descriptions and analyses of ways of experiencing the flexibility and the learning that is afforded in the programme. Data sources in this study included in-depth interviews and questionnaires (second-order data) as well as naturalistic data from submitted course work (first-order data). The entire population consisted of one hundred and ten students who, having finished the first course in the programme, had submitted attribute data and a questionnaire covering flexibility-related choices and weightings, a questionnaire supplemented with open-ended questions to tap into individual experiences of learning. Of these one hundred and ten students twenty-two students had to date also finished the second course and had filled in a Course Experience Questionnaire (CEQ) before moving on to the third course in the programme. Twenty of these students who had completed the second course were randomly chosen for a learning outcomes analysis. The course work they submitted in the last assignment of the second course was evaluated by course professors using the SOLO-taxonomy (Biggs & Collis, 1982). Ten students were selected for in-depth interviews. The selection was strategic in that there was an explicit wish to cover as broad a range of diversity in backgrounds and in experienced flexibility as possible, while at the same time getting hold of students who had come far in the programme and who were in the geographical vicinity of the research team. Interviews were eventually conducted in Sweden and Germany with nationals from a range of countries in the whole world.

<i>Types of data</i>	<i>N</i>
Attribute data	272
Flexibility Questionnaire	110
Course Experience Questionnaire	22
SOLO-taxonomy: Course work	20
In-depth interviews	10

Table 1. Types of data in the study.

The analyses proceeded from two points, from a quantitative and a qualitative perspective. We based the quantitative analyses on whether students stated that they communicated with others in the course or not. This distinctive characteristic was then used to tease out differences and similarities in how students in the LUMA-GIS programme went about their learning of GIS and how they experienced the learning it afforded. For the qualitative analyses two different approaches were used; the first one starting from the quality of learning, in terms of referential and structural aspects of submitted course work, and the other starting from the in-depth interviews in

order to understand the individual experience of learning and be able to describe it on a collective level. The results from the qualitative analyses were then related to the results of the quantitative analysis.

### **The LUMA-GIS student population**

The LUMA-GIS programme attracts students from all continents of the world and today has over four hundred students enrolled. Our attribute data is based on a questionnaire where students give background information about themselves and their family-, work-, ICT- and study conditions.

Presently we have data from 272 students:

- 70% of the students are men and 30% women
- Age span of students range from 20 to 60 years, with an average of 31 years.
- Students come mainly from engineering and science backgrounds.
- 60% are single, 30% live family lives with children and 10% are married without children.
- 65% state that they can find a comfortable study environment at home.
- 21% do not work while studying but 62% work fulltime, 6% work halftime and 9% work part-time.
- 10% of students get financial support for their studies from their employer.
- 4% state that they do not have easy access to a computer with internet connection while 53% have it at home, 52% at work and 24% find it elsewhere.
- 95% feel confident as ICT- and internet users but 13% still feel that computers make studying harder.

## **INITIAL DATA ANALYSIS AND INTERPRETATION**

### **Quantitative perspective**

After the completion of the first course in the programme all students filled in a questionnaire about their studying and their flexibility-related learning experiences. Of the 110 students who to date have answered this questionnaire on the introductory course 78% stated that they communicated with fellow students. Of the eighty-six respondents who stated that they did communicate with fellow students more than 25% stated that they had never communicated for social reasons. In contrast, the fraction of students who had never communicated about course work was only 5%, and never communicated about technical difficulties was 12%, respectively. The importance of communicating about course work was rated to 2.9 of a possible high score of 4, about technical matters was rated to 3,0 while the importance of communicating for social reasons scored 2,5. Students networked mainly to address and solve technical difficulties and to facilitate course work discussions and valued this kind of networking related to content and form to a greater extent than communicating for purely social reasons.

On-line forums were set up to facilitate student communication both with fellow students and course teachers. When asked to what extent these forums were helpful in their learning, i.e. in their understanding of GIS, the results show that students did not use the forums as much as could be expected but those who did favoured communication with peers. As many as 19% of students had never entered the forum for student peer communication and almost twice as many, 35% of students, had never entered the forum that facilitated discussions with course teachers. The ones who had used the forums rated the importance of both these forums to 2, 8 of a possible high score of 4.

After the completion of the second course in the programme all students filled in a Course Experience Questionnaire (CEQ) covering six scales <sup>1</sup>[CEQ-scores range from -100 to +100 and answers are given on a scale from one to five]. Twenty-two students have to date submitted the questionnaire. Results from the CEQ-report for these students give the following CEQ-scores on the six scales: *Good teaching* +41 (StdDev 45,2); *Clear goals and standards* +39 (StdDev 30,2); *Appropriate assessment* +53 (StdDev 35,2); *Appropriate workload* +21 (StdDev 36,9); *Generic skills* +30 (StdDev 40,8); and, *Learning community* -10 (StdDev 56,1). Notice specifically the negative score for Learning

community and the high standard deviation in this scale. The question that fared worse in the Learning community scale was: “Students’ ideas and suggestions were used during the course” (-32, StdDev 60,8) and in the questionnaire as a whole: “The course helped me develop my ability to work as a team member” (Generic skills, -39, StdDev 65,3). A tentative analysis would hold that students are quite satisfied with the course but do not feel they are part of a learning community, neither with teachers nor fellow students.

### Qualitative perspective

Using the Structure of the Observed Learning Outcomes (SOLO) taxonomy (Biggs & Collis, 1982; Trigwell & Prosser, 1991; Burnett, 1999) GIS-professors measured the learning outcomes of the integrative essay-type final assignment of the second course in the programme. The comprehensive version of the Solo-taxonomy holds nine levels—in ascending order from *prestructural*, *unistructural*, *multistructural* (three sub-categories), and *relational* (three sub-categories), to the *extended abstract* level. Twenty assignments were assessed in this fashion and the learning outcomes were graded on a scale from zero to eight.

Results from the assessment ranged from three to eight, where those who attained scores between six and eight were classified as *high scorers* while those attaining between three and five were classified as *low scorers*. Accordingly, nine students were classified as high scorers while eleven were classified as low scorers. A provisional analysis might indicate that of the five women in this study only one is among the high scorers, and she scored the lowest in this category - a six. Among the low scorers three of the four women scored the lowest in their category - a three - and one the highest - a five. Does this mean that women do not do as well as men in this course?

Tendency to feel part of a Learning community in the course (average on four-point scale)					
All (N=20)	2,8	Low scorers (N=11)	2,5	High scorers (N=9)	3,4
Men (N=15)	3,0	(N=7)	2,9	(N=8)	3,3
Women (N=5)	2,2	(N=4)	1,8	(N=1)	3,8

Table 2. Tendency to feel part of a Learning community in the course.

The average CEQ-score for the questions in the *Learning community* scale was 2,8 (out of a possible high score of five) for all twenty-one students but for the high scorers the average was 3,4 and for the low scorers it was 2,5. For the women in this study the average CEQ-score for the questions in the *Learning community* scale was 2,2 and if we only look at the low scoring women it was as low as 1,8. (The corresponding results for all men in this study is 3,0 and for the low scoring men it is 2,9).

The provisional results would indicate that the differences in outcome between men and women can be put down to different learning experiences in the virtual learning environment. It would seem that those who scored high on the last assignment in the second course networked and made use of the learning community provided in the course to a much higher degree than those who scored low.

Preliminary analyses also show that high scoring students come from disciplinary backgrounds closer to GIS than low scoring students do. Disciplinary- and academic scholarship is something which probably is an advantage in the programme in that these students can rely on previous knowledge, expertise and skills - at least to some extent. Preliminary analyses also show that nationality, age, family- and work situation play no role in the successful realisation of distance learning as we have both low and high scoring students from all parts of the world; of equivalent age; single or married, with children or without; working simultaneously or not.

As we have seen the one factor that seems to make a difference is networking, i.e. communicating with others in the course. The twenty students who were categorised as high or low scorers showed different patterns of networking depending on whom they communicated with.

Tendency to communicate with others in the course (average on four-point scale)					
All (N=20)	3,0	Low scorers (N=9)	2,9	High scorers (N=7)	3,1
Communicating with students (N=16)	2,9	(N=9)	2,4	(N=7)	3,3
“Never did that” (N=4)		(N=2)		(N=2)	
Communicating with teachers (N=11)	3,1	(N=5)	3,4	(N=6)	2,8
“Never did that” (N=9)		(N=6)		(N=3)	

Table 3. Tendency to communicate with others in the course.

High scoring students communicate both with fellow students and with teachers but valued their peer-to-peer networking more than they value communication with teachers in the course. Low scoring students on the other hand seem to communicate more with fellow students than with teachers but did not value their peer-to-peer networking as much as they valued communicating with their teachers.

The in-depth interviews are still under analysis but some tendencies can be discerned at this early stage. LUMA-GIS students are probably like most distance students but we were surprised how *international* international students really are. The programme has students in 75 countries but among the ten we interviewed we found that most of them had set roots in at least three countries—born in one country, undergraduate degree from another country, spouse from third country, living in fourth country, doing Ph.D. studies in a fifth, and so on—something which we did not capture in our questionnaires.

The aim of our analysis is to be able to describe the qualitatively different ways students in the LUMA-GIS programme experience their learning and studying in the flexible learning environment. *The experience of flexibility* seems to be more complex than our traditional notion of flexibility in time, place and pace. Some students create new paths through the courses and learn in new creative ways as they jump between designed and intentionally ordered modules while they wait for feedback or response on a query – and most queries seem to get solved this way. Other students instead experience the ordered modules as a marked path on a board game and do not even discern the possibility of skipping ahead when forced to idleness waiting for a response, sometimes for up to two weeks.

Students also differ in how they *address available course work format*—text, audio, video, self tests and interactive tools, all available on-line or on a cd-ROM—some use all formats in an elaborate plan to “cover everything” and “fail-safe” before the exam, some use the different format to complement their busy schedule and use commuting time on the train for watching video lectures or are sure to carry the “emergency pack” (course on cd-ROM) when travelling and the plane is late. Still others stick with reading printed text unless, or until, they hit a wall or dead-end in their efforts to comprehend the content. Another difference is how student *address different modes of knowledge*—the practical and theoretical exercises—some start by “getting their hands dirty” and move on to theoretical exercises in an effort to fill experienced knowledge gaps while others need to experience a sense of theoretical expertise before they dare venture down the practical path.

Students differ also in their *approach to teachers* in the programme, naturally based on previous experiences in previous studies. Some students express excessive respect and awe for teachers, they are more cautious in their communication with teachers and do not want to trouble teachers with “stupid questions” but establish contact in

order to get “the right answers”. Others students see teachers as knowledgeable experts who are there to tutor the next generation of GIS-masters and communicate readily with teachers from an apprentice’s point of view.

Students seem to *approach their learning community* in different ways. Some students experience the learning environment as a tangibly virtual environment where information is stored but as a meeting place “without soul”. They take what they need from it but do not contribute themselves. Others experience the learning environment at it’s website as “the course”. This is probably correlated to their *experience as students*, since some identify themselves as students in the course the same instance they go on-line. Others again find it hard to invoke this feeling of belonging.

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