

Teacher's Opinions of the Incorporation of GIS in the Upper Secondary Schools in Finland

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Introduction

- questionnaire survey on upper secondary school geography teachers' opinions of GIS
- took place in spring 2005
- e-mail invitation with the questionnaire was sent to 419 teachers
- 51 did not receive the invitation due to changed e-mail addresses

Introduction

- 368 teachers received the questionnaire
- 63 respondents, a reply rate of 17.1%
- some data was lost due to a server breakdown
- respondents location encompassed quite well the different geographical areas of Finland

Background

- GIS was incorporated into the upper secondary school curriculum in Finland in August 2005
- an elective and advanced geography course (GE4) on regional studies
- the students will use GIS as a tool for collecting regional data and producing thematic maps

Background

- GIS has the potential to facilitate Problem-Based (PBL) and Inquiry-Based Learning
- GIS improves student attitudes towards learning by increasing the relevance of geographical study and encouraging more focused thought (West 2003)
- GIS helps the students to "do science" (Baker and Bednarz 2003)
- may require renovation of customary approaches and teaching methods

GIS as a visualization tool

- map making is a process involving cognitive transformations with intellectual and visual components (Wandersee 1990)
- conceptualize scientific results (Schmitz & White 2003)
- GIS supports the production of graphic representation and encourages the students to improve their graphic skills

Socio-constructivism and GIS teaching

- the focus in learning process is on the action and understanding of this action, which is socially constructed
- student collaboration in using GIS
- construction of a research problem and solving it in interaction with other students during the research process

Socio-constructivism and GIS teaching

- lack of concrete evidence of the effectiveness of GIS in the curriculum
- important to ensure that the students will understand the phenomena beyond the research problems
- "teaching about GIS" vs. "teaching with GIS" (Sui 1995)

Does GIS promote the competence of geography as science?

- geography's role in the curriculum is discussed in many countries
- GIS instruction may promote geographic competence and interdisciplinary learning at schools (Baker 2002)
- ability to combine science and humanities in PBL and IBL
- GIS may attract students to become geographers

Obstacles of using GIS at schools

- limited access to and availability of hardware and software
- limited resources and little time
- lack of teacher training on GIS
- lack of experience and skills
- also systematic barriers to encourage innovation in education

Results of the questionnaire survey

- 67.2 % of respondents thought that GIS teaching should be solitary learning
- the opposite view to the socio-constructive pedagogy linked with GIS
- PBL was considered as an important way of learning by 27.9 % of respondents

Results of the questionnaire survey

- Internet based map services, statistical data and animations were used more commonly than GIS at schools
- the novelty of GIS affects the teachers' answers, which were contradictory in some questions
- 26 teachers thought that GIS enhances geographical thinking but made no comment that GIS and socio-constructive pedagogy together are a geographical problem-solving method

Results of the questionnaire survey

- 79 % of the respondents thought that GIS deepens geographical thinking
- still many teachers were sceptical that learning GIS is time-consuming and may retrain the development of students' geographical thinking
- 64.4% of teachers considered the lack of time to learn GIS as an obstacle

Results of the questionnaire survey

- some teachers were worried about the computerization of geographical education
- some said that traditional methods are more useful than desktop mapping
- 56.6% of respondents agreed or strongly agreed that the objectives of geography teaching are possible to achieve without GIS

Results of the questionnaire survey

- only 13 respondents had used desktop GIS during the lessons
- GIS was mostly used for map visualization and making thematic maps
- the reasons mentioned for not using GIS were, for example, lack of school resources and teachers' GIS skills

Teachers' opinions of the aims of geographical teaching in order of importance

1= most important and 10= the least important, % of respondents

	1	2	3	4	5	6	7	8	9	10
Acquiring, interpreting and evaluating geographic data.	20.6	14.3	14.3	11.1	4.8	7.9	9.5	11.1	4.8	1.6
Visualizing geographical data with ICT.	4.8	3.2	4.8	4.8	4.8	1.6	11.1	4.8	11.1	49.2
Representing regional phenomena, structures and interactions.	22.2	20.6	4.8	9.5	11.1	4.8	6.3	7.9	4.8	3.2
Understanding the concepts of region, space and place.	20.6	6.3	7.9	7.9	7.9	9.5	7.9	15.9	4.8	6.3
Understanding natural landscape and processes.	6.6	14.3	7.9	19.0	11.1	9.5	6.3	9.5	7.9	4.8
Observing, analysing and evaluating the state of the environment.	8.2	3.2	14.3	15.9	11.1	15.9	9.5	7.9	3.2	7.9
Understanding different cultures, tolerance and respect of otherness.	7.9	4.8	6.3	7.9	9.5	9.5	14.3	15.9	14.3	4.8
Understanding regional planning processes and ways to affect local environmental affairs.	3.2	4.8	7.9	4.8	15.9	9.5	6.3	17.5	25.4	4.8
Understanding maps and map skills.	12.7	12.7	12.7	12.7	12.7	11.1	6.3	3.2	3.2	7.9
Understanding regional development and the issues of economic and social inequality.	3.2	15.9	9.5	3.2	4.8	7.9	14.3	22.2	9.5	4.8

Teachers' opinions of GIS

	Strongly agree	Quite agree	I don't know	Quite disagree	Strongly disagree
Teaching with GIS is important.	19.4	35.5	17.7	24.2	3.2
My skills to teach GIS are good.	1.6	14.5	12.9	50.0	21.0
I believe that the aims of geography teaching are possible to achieve without using GIS.	22.6	33.9	19.4	19.4	4.8
There are too many contents in high school geography.	12.9	35.5	21.0	29.0	1.6
GIS software is difficult to use.	14.5	30.6	40.3	12.9	1.6
GIS use enhances geographical thinking.	24.2	54.8	16.1	3.2	1.6
There should be a special GIS course in high school curriculum.	27.4	14.5	17.7	27.4	12.9
GIS has a too important role in the current curriculum.	13.1	29.5	21.3	29.5	6.6

Teachers' opinions of GIS

	Strongly agree	Quite agree	I don't know	Quite disagree	Strongly disagree
Current fixed-hour allocation does not enable to realize the aims of geography defined in the curriculum.	29.0	48.4	8.1	11.3	3.2
Current fixed-hour allocation does not enable to realize the aims of GIS education defined in the curriculum.	40.3	33.9	14.5	9.7	1.6
Teaching with GIS enhances evolves students' problem solving skills.	21.3	47.5	29.5	1.6	0
GIS enhances cooperative learning.	8.3	33.3	38.3	16.7	3.3
Teachers do not have time to learn new GIS software.	27.1	37.3	15.3	15.3	5.1
Teaching with GIS changes traditional teaching conceptions.	5.1	33.9	32.2	20.3	8.5
Teaching with GIS is multi-disciplinary.	17.5	54.4	22.8	5.3	0
GIS belongs to universities not to high schools.	17.5	22.8	19.3	29.8	10.5

Teachers' opinions of GIS

	Strongly agree	Quite agree	I don't know	Quite disagree	Strongly disagree
GIS can be taught by traditional methods.	14.0	43.9	15.8	22.8	3.5
GIS revolutionizes geography learning and instruction.	0	7.1	33.9	41.1	17.9
GIS is a important geography teaching technology.	8.9	42.9	28.6	17.9	1.8

Discussion

- teachers' knowledge of GIS is not very good
- they were not familiar with the GIS technology or suitable pedagogy
- they did not feel that GIS is easily incorporated into their curricula
- Do the teachers have realistic opportunities to teach with GIS in a socio-constructive way?

Discussion

- in-service teacher training on GIS is in high demand
- almost half of the respondents had not received any training on GIS
- it is likely that teachers without any knowlegde on GIS did not respond to the questionnaire
- teachers' frustration in using GIS in their curricula is more based on the lack of experience on GIS applications than on the lack of ICT skills in general

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Thank you for listening!

You are welcome to ask more from:

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