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MASS GIS E-LEARNING LECTURE: BACK EXPERIMENT

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Abstract:

The integration of distance e-learning system in some French Master, and more especially in Geographic information system courses, has three interests: open and extend the Master education to French speaking students around the World by the way of the World French University Agency (Agence Universitaire de la Francophonie); increase the number of students admit in Master for the same number of lecturers; and update the quality and the flexibility of education. Its result from this educational policy in GIS lectures for the AIGEME Master around 160 students for only one lecturer. This situation has imposed to develop specific material and content, automatic methods of assessments and monitoring.

Key words: GIS e-learning, Mass lectures, Assessment and follow-up automation

Introduction

In France the move transition to the university level system LMD or Licence, Master, Doctorate has given of some Master with the support of university e-campus the implementation of e-learning training and distance digital Master education including geographic information systems theoretical and practical trainings. The coming of GIS e-learning, still marginal in the French university system of education, has changed some aspects of GIS education: it is allowing the generalisation of GIS courses in different disciplinary. E-learning is developed as a way of increase the number of students, a tool to improving GIS mass lectures. Also, within the network of the World French University Speaking Agency (AUF), give access into some developing countries to GIS courses and develop local GI applies. But the high number of master students to manage and monitoring has quickly imposed to create specific material and content, automatic methods of assessments.

1 GIS e-learning: flexibility and economies of scales

1.1 The e-learning philosophy

For the Ministry of national education and scientist research, and quite more as some of French universities the moving to digital pedagogy and material lectures in GIS has allowed to upgrade and transform the content of lectures and exercises. In parallel to this increase of the formal level of education, the true interest to promote and develop e-learning and distance learning GIS courses is three. First, it to have material supports in GIS for students are learning GIS lectures at directly at AIGEME Master (University of Marne-la-Vallée). Second, it to increase the number of students can be accepted in Master and in GIS courses that are 160 people around at 2005/2006. The courses organisation is structured in two periods: one day each month of face to face lectures and practises in classroom with the lecturer in four class group; tree weeks of e-learning lectures at university or at home. During the three weeks of GIS e-learning courses, students must send each end of week practical exercise in geographic information system. The e-learning platform used is WebCT, the GIS software Intergraph Geomedia. All students have

the last version Intergraph of Geomedia at home for free during time of GIS courses. Thirdly, the development of e-learning courses in GIS increases and opens to the French speaking students in the World and come from more especially from ex French colonies in Africa, in Caribbean and South East Asia. These students, structured in three virtual classrooms (Asia, Africa and America) allow lectures in full distance learning without any physical contact with lecturers. Courses are structured in three parts: audio chat and audio conferences lectures each two weeks for each virtual classroom during one day, two weeks of individual training and learning on digital materials and courses with practical exercise to sent, and research thesis in GIS, cartography or remote sensing to do. The choice don't to implement video streaming or video conferences is link to the low speed Internet access in some countries like the Niger, Thad, etc. inside the World French speaking digital campus receiving local students. In some countries like the Comoros, the problem is more the numerous short Internet cuttings limitation the use of video conferences. The friendly Intergraph agreement giving possibilities to all students around the World to practise during some months geographic information systems and to develop locally applications on specific needs and topics: forestry, environmental monitoring and impacts, epidemiology, land planning and land change, etc. Most of them don't have financial possibilities to GIS software, as temporary for one year.

1.2 Mass lectures and economy of scales

The development of e-learning courses and more mass student training of more one hundred people is appreciated as a way of scale economy. The financial investment for the creation and the starting of digital material lectures, exercises and GIS software's is round about 10000 Euros, tutoring and lectures for 2500 Euros each year. Only one temporary lecturer giving extra courses teaching and managing digital lectures for decrease credits affected to GIS e-learning. He monitors the different classrooms that are 160 students for this university year during a semester. The development of the e-learning educations also allows universities and the State of the substantial economies of scale. GIS e-learning lectures are perceived as a means to make decrease the cost of the educations by the decrease of the number of lectures, quite as the number of temporary lecturers, senior lecturers or professors. They were also conceived or more exactly presented as such. The substantial replacement of the number of classroom lectures and teachers in geomatic by the digital e-learning educations placed every professor to follow and to manage directly, alone, around 160 Master students. If teaching to 160 students shared out between face-to-face or virtual classrooms conferences doesn't give specifically problems, the daily student is monitoring and the week correction of practical exercises making full of job for only one teacher. The important increase of the professor's workload led very quickly to transform the GIS e-lecture contents and especially the modes and the modalities of the student follow-up and controls. The teacher has also to learn e-learning tools to manage his course, tools such as tools for organize pages (synopsis, links), tools for contents of course (program course, banks of image, glossary, index), tools of communication (forum, mail, chat, divide table, calendars, tricks and easy ways for students, audio-forum,...), tools for evaluation and activities (quiz, auto-assessment, student works or presentation). That accentuates the workload, but gives a full control and management of GIS e-learning courses. Among this tools, the tools of communication such as mail, because they are not specific to e-learning and well known are the most use by students. They are an important source of work which is not or insufficiently integrated in the professor's workload by institutions. Moreover, e-mails are not always correctly used: they are not an urgency tool but they are frequently used in that way...

2. Pedagogy aspects of mass GIS e-learning courses

2.1 Mass GIS training and increases of GI applications

The mass GIS e-learning lectures are giving a more large audience to geographic information sciences in general and more particularly to geographic information systems towards students coming from different disciplinary, to geomatic applies interests and functional possibilities in environment, land planning, economy, engineering, etc. Futures AIGEME student engineers and executives can be discover GIS applies as a part of the information system world and connect GI with other lectures and training they have in programming, databases and information systems. After the semester of GIS courses, some students don't come from "classical" GI users like environmentalists, geographers, computer scientists are able to develop geomatic applied in economy and multimedia in the way of the master thesis. It is one of the positive aspects of mass GIS lectures. World French Speaking University Agency's students are in distance training courses are the most new important GIS users in the large topics of themes, more especially in Africa: epidemiology, economy, urbanism, forestry, tourisms, etc. The absence or the obsolescence of geographic information, of socio-economical or urban database systems, updated database census, the territories complexity and the rapid growth and land structure changes of the lands in developing countries improve the use of geographic information systems and remote sensing data. Development of distance e-learning courses towards students of developing countries by the way of the AUF e-campus participate at a more flexible and direct transfers of knowledge, practises and use of geographic information systems.

2.2. Mass lectures and follow-up GIS work

But if the digital and distance lectures in GIS allow to extend the teaching of GI and to participate at it expansion, the high number of students to monitoring, teaching and evaluate are bit hard for only one lecturer. The problem is not the GIS course content, but the weekly follow-up work of students, the estimate of GIS practises and exercises, the proofreading of examination. The e-learning course summary is organised in tree points: the conceptual and theoretical chapter, the training lecture on Intergraph GeoMedia Pro, and the memo chapter including history of GIS, geographic information definitions and characteristics, reference systems, databases systems, etc. The content of lectures is separated in two parts: the conceptual and theoretical aspects of geographic information systems including in addition numerous articles, chapter extracts of books, reports, PhD memories, and a practical GIS training part. This second part, the GIS training part include all Geomedia functions with practical exercises to do at computer room or at home and to send every week.

The first chapter structured in four parts [(1) GIS definition, multiplicity of concepts, from GIS to geographic information sciences, etc. (2) GIS used, GIS functions, GIS structures, databases, conceptual GIS models, etc. (3) geo-encoding, geo-referencing, referenced systems, etc., and (4) GIS analysis, GIS cartography, Web GIS, etc.] is one of the most common e-learning lectures students can be find. In each 4 parts of this chapter are included a specific lecture segment on questions of *Cultures géomatiques* (Geomatic Cultures in English). This specific segment of lectures incorporated in each part chapter has several pedagogical objectives: first, to set in motion the students to read a minimum of literature in Geographic information systems. Second, read, learn, the panel of uses and applied of GIS. Thirdly, push the students that GIS are not only technical tools, but concepts, approaches and methodologies of spatial and territorial analysis and modelling giving an understanding and knowledge of geographical space. The last interest of this "geomatic cultural" part of lectures is to give to GIS students some elements of methodological appropriation in GIS by the articles, books, reports analysis and commentaries process calculus. The evaluation consist to deposit on the WebCT platform every weeks a summary of one to two pages with the problematic of the paper, the topic objectives, data, flow chart process, results and limits of methodological approach. The goal is "to immerse" GIS students inside the geomatic culture approaches for appropriate gradually during the lecture semester different ways of work in geographic information systems.

2.3. GIS training and automation

The second chapter, the training course of this teaching is divided in three parts: (1) *Introduction to Geomedia*, (2) *work sequence “display and analyze”*, (3) *Geomedia: the first handling*. A fourth part proposes these different parts in light files. It was added after chat sessions. Students with low speed Internet access from developing countries asked for it. They could more easily practice without having to be connected. The first part presents the software Geomedia, its concepts, its terminology and the essential notions of geoworkspace and entity. Then, a practical exercise from the creation of a geoworkspace to the impression of a map is offer to the student. This sequence introduce to systems of coordinated, warehouses and connections, map windows, data windows, queries, thematic mapping and labelling. The third part of this training course explains with interactive chart process how to practically use the GIS software. The students have to follow step to step the chart to learn the handling. These charts concern geoworkspaces, warehouses, entities, coordinate systems, scalable maps, and display. Finally, to the students interested by GIS creation, the teacher suggests to explore a more advanced practical exercise from the creation of a geoworkspace to the data export. This sequence explains how to create new entities, to change entities, to georeference and to validate geographical data. GIS training course is regularly “updated”: new exercises proposing new sequences associating different GIS functions learned during the conceptual and theoretical aspects of geographic information systems (chapter 1) are added.

3. First pedagogic results and back experiments

3.1. Evaluation and monitoring

The concept of knowledge acquisition is doing automatically by QCM system every week. This type of evaluation and student follow up concern the first and second chapters: conceptual and theoretical aspects of geographic information systems and GIS practical training. The teacher implements questions and responses possibilities, and the system giving automatically for each student, score, mark and corrections. A question database is progressively completed. Questions are picked from the database. After two years, the number of registered questions is important. Numerous combinations are possible and a lot of different QCM realized. The student monitoring takes several forms: (1) time and period of student connection on digital lectures chapters, (2) GIS lecture forum ; each student exchanging questions, answering, help and information, (3) directs discussions with the GIS teacher by internal email and by chat sessions, (4) practical training supports with in addition materials given by Intergraph. For example, for a training started on November 2005, some student’s first connection was from November 7, 2005 and some from February 3, 2006: three months difference! About the number of connection between November and May, differences are also important: from 0 to 879! During the same period, 139 messages were sent on the GIS student forum. 64 were exchanging about exercises. 733 mails were exchanged (615 sent, 118 received) between teacher and students. The teacher sent much more mails because of he often inform all the students on the WebCT platform. Two years of experiment in AIGEME Master (University of Marne-la-Vallée) authorize an assessment (tab.1)

Table 1: GIS e-learning: results of the AIGEME Master (UMLV) in 2005 and 2006

	UMLV students	UMLV students passed	% positive result	AUF students	AUF students passed	% positive result	CFA students	CFA students passed	% positive result
2005	58	45	78	20	9	45	0	0	-
2006	74	62	84	24	13	54	46	45	98

Students with one day each month of face to face lectures and practises in classroom with the lecturer seems to have better results than students, structured in virtual classrooms with lectures in full distance learning without any physical contact with lecturers. At least, last category of students appear in 2006, with one day each month of face to face lectures and practises in classroom with the lecturer and tree weeks of work in enterprise with eventually e-learning lectures at home, has even better results.

3.2. The question of monitoring time

The central problem is the growth of the time spent to follow the students and to correct the practices and GIS work. This time spent is accentuated by the technical management of the GIS e-learning lecture on the WebCT platform. All this time is not taken in the load of teaching and monitoring. The GIS audience has increased because of the digital lecture development. With the growth of the number of students, the question of monitoring becomes a hard problem. One of the ways had been the automation of some examinations, and the increase of the GIS student autonomy work.

Concerning the planning, instead of having one or two days each month of face to face lectures and practises in classroom with the lecturer in four class group and tree weeks of e-learning lectures at university or at home (table 2), the new timetable would propose one entire week of face to face for each group (table3). Students would have an intensive training course. Their works would be the experiment of the management of a GIS project related to the local territory. This organisation should increase both autonomy of the students and their ability to work in group. Nevertheless, the possibility would be effective only for the students registered at the University of Marne-la-Vallée because it seems it will be very difficult for students living in developing country registered at the World French University Agency (AUF) to work in group with low Internet access. The work in group appears as one the possible response to the problem of monitoring numerous students by only one teacher. For the teacher, the number of works to evaluate could be divided by 3 or 4, and for the students it would be an initiation to professional framework of GIS project. The main difficulty still remaining is to identify correctly the part of each member of the group, (but this is not particularly linked to e-learning and could be managed by a teacher used to).

Table 3: An example of planning on 16 weeks for students and lecturer

Group	Week	Day	GIS Lecture	GIS Self-learning	GIS Exams
1	1	1	9h00-12h00	14h00-18h00	
2	2	1	9h00-12h00	14h00-18h00	
3	3	1	9h00-12h00	14h00-18h00	
4	4	1	9h00-12h00	14h00-18h00	
1	5	1	9h00-12h00	14h00-18h00	
1	5	2	9h00-12h00	14h00-18h00	
2	6	1	9h00-12h00	14h00-18h00	
2	6	2	9h00-12h00	14h00-18h00	
3	7	1	9h00-12h00	14h00-18h00	
3	7	2	9h00-12h00	14h00-18h00	
4	8	1	9h00-12h00	14h00-18h00	
4	8	2	9h00-12h00	14h00-18h00	
1	9	1			9h00-12h00

2	10	1	9h00-12h00
3	11	1	9h00-12h00
4	12	1	GIS 9h00-12h00

Table 3: An example of planning on 1 week for students and lecturer

Group	Week	Day	GIS lecture	Gis project
1	1	1	9h-12h	14h-18h
1	1	2	9h-12h	14h-18h
1	1	3	9h-12h	14h-18h
1	1	4	9h-12h	14h-18h
2	2	1	9h-12h	14h-18h
2	2	2	9h-12h	14h-18h
2	2	3	9h-12h	14h-18h
2	2	4	9h-12h	14h-18h
3	3	1	9h-12h	14h-18h
3	3	2	9h-12h	14h-18h
3	3	3	9h-12h	14h-18h
3	3	4	9h-12h	14h-18h
4	4	1	9h-12h	14h-18h
4	4	2	9h-12h	14h-18h
4	4	3	9h-12h	14h-18h
4	4	4	9h-12h	14h-18h

Conclusion

E-learning seems to be more effective associated with face to face lectures. Does it mean that knowledge acquisition needs physical presence? Does it rather mean that the e-learning course has to be improved? Or, does it mean the students of the network of the World French University Speaking Agency (AUF) have much different than those of the French university? Anyway, with about 150 students and intensive use of web technologies, the teacher has additional time to follow (forum, mail, chat) and evaluate the knowledge acquisition (QCM, look at student's GIS production). He is also very much in demand to update more frequently course and practical exercises. Weekly monitoring and updating are probably the most serious limit to the development of GIS e-learning courses.

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