Evaluating e-labs' Experimentation

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Abstract : This communication discusses preliminary results on an experimentation of e-Learning with MIS students, mainly in order to cope with the logistics of lab organization. A learning management software was installed which changed completely the learning process, from content to logistics. Students have expressed their satisfaction with the e-Learning approach. A comparison was computed on their performance improvement in order to assess the usefulness of the learning. Despite its limits, the study has encourage the course coordinator to implement the software use on a broader basis.

Keywords: e-Learning, laboratory, tutor, learning management

1. Introduction

In order to survive, the Higher Education Institutions of the 21st Century will increasingly rely on various forms of electronic delivery and communication inside a marketplace that requires education to be flexible.

Hall (2000 [a]) contends e-Learning will take the form of complete courses, access to content for "just-in-time" learning, access to components, any courses and services, and the separation of "courses" to acquire and test knowledge vs. content as an immediate, applicable resource to resolve an immediate, perhaps, one time only problem.

Learning is and will continue to be a lifelong process, that could be accessed anywhere at anytime to meet a specific need or want. Hall (2000 [a]) added that more links to real-time data and research would become readily available. Given the progression of the definitions, web-based training, online learning, e-Learning, distributed learning, internet-based learning and net-based learning all speak of each other (Gotschall, 2000; Hall & Snider, 2000; Urdan & Weggen, 2000).

L'École des Sciences de la Gestion (ESG-UQAM) is making progress on enhancing the Information and Communication Technologies (ICT) infrastructure for its learning, teaching and lab logistics.

e-Learning is a very effective method of learning and lab's logistic (Hall, 2000 [b] ; Mosterman and al., 1994) for adults who have busy schedules or live in remote areas are unable to attend an every day traditional school. Two independent research studies conducted by Researchers at Colorado State's AACSB-accredited business school compared distance students to their campus counterparts and to executive MBA cohort students on 12 specific competencies. Results found distance students reported higher measures on technology than the executive MBA group. The study looked at several levels of learning: social, procedural, explanatory, and cognitive. The results determined that online learning allows for greater explanatory and cognitive learning and residential study highlights and improves social and procedural learning. (Kretovics. M and McCambridge, 2002 ; Empirical study, 2001).

More and more computer learning will be done in different time and format. University undergraduates will expect to find higher dependence on technologies. Wider participation from a broader cross-section of society will also drive institutions away from 'one-size-fits all' mentalities. Universities are making a lot of progress in enhancing learning Information and Communication Technologies (ICT) infrastructures, teaching, and labs' logistics. (O'Hagan, 2002 ; Paulsen, 2000 ; Keegan, 2000).

Management students must become literate in MIS theory and must be able to use spreadsheets and software database. For non-english students good texts are uncommon and learning relies mainly on labs, traditionally given by graduate students. Two difficulties are frequently observed : labs availability (Wagner and Tuttas, 2001) and educational quality (IHEP 2000).

2. e-Learning labs at ESG UQAM

Historically, laboratories were planed in order to satisfy sporadic needs, not to deal with

Internet's incredible pressure on labs' usages. The demand for workstation has exploded and reserving a lab for a group is very difficult nowadays. As more and more courses are given in labs; it also implies to decide when to reserve in order to accommodate day and night customers.

Recruiting graduate students to teach those labs is also a difficult task as they are expected to be software experts, pedagogic experts, group management experts … but paid as low as possible. Unfortunately after every session many of them quit for many reasons, including the fact that they graduate. This forces the director to recruit, form, and supervise new assistants.

Clearly, a new approach was needed and e-Learning introduction was decided on an experimental basis. The University of Quebec in Montreal has installed software management training which changed completely the learning process, from content to logistics.

The University of Quebec in Montreal support and encourage the effective and timely use of digital technologies and resources in the learning and teaching process. In doing so, it seeks to achieve its institutional goals and to attain the vision to be locally, nationally, and internationally competitive and collaborative in an increasingly technology-enabled environment. New teaching models that incorporate e-Learning is already being explored at the University of Quebec in Montreal to deal with the increase of students and to respond to changes or improvements in the development of specific skills subjects.

The University is also committed to explore Continuing Professional Development opportunities:

- Distributed and off-campus learning situations are increasing. E-Learning offers flexible solutions to managing this change facing limited staff time, resources and improve labs' logistics.
- Short courses and continuing education within the University are likely to tap into e-Learning in order to expand its share of this market. E-Learning can potentially facilitate collaboration with other universities.
- Undergraduate courses with an increasing intake of part-time and overseas (distance) students with differing needs are likely to increase their use of technology and to provide more flexible support.
- Development of North American e-universities will open up many new possibilities for higher education institutions in marketing and purchasing education, for which the organizations must be ready with both technical and cultural aspects.

This communication discusses preliminary results of e-Learning experiences aimed at alleviate the logistics of lab's organization for MIS students in University of Quebec in Montreal, the second largest business school of Canada.

e-Learning appears to be an inescapable tool in employees training of today's modern society. E-Learning offers a multitude of tools such as course content, platform management, and systems for creating interactive contents.

Academic and professional literatures promise many benefits to be derived from e-Learning systems. The Training Magazine's 1999 statistics (Industry Report 1999) report that companies are shifting from on-site classrooms to on-line learning. There are many reason for moving from traditional learning to a system of e-Learning that include cost factors (Urdan & Weggen 2000), training materials which are available anywhere and anytime (Downes, 1998), the changing nature of work and the move to a knowledge economy (Broadbent 2000), the move from "just-in-case" to "just-in-time" learning (Urdan & Weggen 2000), the growth in the internet & technology (Urdan & Weggen 2000) and value-added services ; giving less work to the labs' staff and diminishing the congestion with labs' reservations (Sloan Consortium 2003). An E-Learning labs has been developed by research groups at Arizona State University to support teaching activities related to semiconductor device theory to overcome the limitations of a traditional and conventional device simulation laboratory (Vasileska & Kaur 2003). Another study (Beasley and Smyth, 2003) showed that students didn't use the Virtual Learning Environments (VLE) in the ways intended, and the result was not necessarily a negative finding because students found it to be a valuable resource.

The project supposed defining a precise content definition, programming an appropriate micro-content modular approach, and organizing a meaningful environment in order to sustain the theoretical teaching. Students were enrolled in a predetermined sequence,

measured at all steps and they progressed through the lessons under limited access. Prerequisites concepts had to be understood before changing lesson.

3. The EPC Campus platform

An adequate training platform named 'EPC Campus was chosen from the few companies offering a bilingual version of tutorials. The accepted solution contained a learning management system (LMS), named I-tutor. It offers knowledge skills evaluations in order to determine the ideal training plan to be established. High quality training programs in office automation, accessible at all times and final training exams for a complete report on all acquired skills.

I-tutor, the learner's management system, assures a simple and efficient follow-up of the training plan:

- Access control for each user
- Numerous educational and statistical reports
- Easy communication for the learners
- Personalized course catalogue
- Printed accreditation certificates

Training plans developed by EPC allows a significant decrease in average training lengths as it promotes a great flexibility by shorter training periods, allowing the time saved to be used for the actual work itself. In order to succeed with a high quality e-Learning course contents, EPC has based its educational approach on traditional training proven successful for decades. Strongly believing in this concept, the group of courses replicate a traditional method:

- To explain
- To show
- To have learner perform the task (with or without assistance)
- To evaluate

Believing in the success of the training plans, this method is appealing, and it is definitely one of the major arguments to support the high satisfaction of users. Good navigation interface in an LMS facilitates "lurking" and "super-lurking". Many students enjoy and learn from e-Learning's application. Lurking should be allowed and provided for in a good e-Learning environment. A good LMS facilitates compensation measures taken to remedy the "dehumanised" online-networked environment.

4. Data and measures

An instrument was designed and administrated to the summer term enrolled student in order to analyze their performance and satisfaction using the e-Learning approaches. A Likert Scaling is used and rated on 5 items from "strongly disagree" to "strongly agree". The measures are :

- Ergonomics : Many authors (Stamatis & al, 1999 ; Nunes & al, 1996 ; Eisenstadt & al, 1998) have discussed the benefits of ICT course delivery for learners, tutors and institutions. E-Learning System failure will result on E-learner dissatisfaction and non-use, this mean loss of customer in the case of e-Learning faculty service provider. That's why E-Learning system quality criteria concerns Technological and Delivery Systems equipment requirements and specifications. Variables related to the system quality criteria include: Ease of Use, Speed of Access, Level of Graphical Realism, Audio/video Output and Flexibility.
- Contents and Pedagogy : Putting content online (Minton & al, 2003) for e-Learning is a totally new challenge for many searchers. Course content is a central feature in any e-Learning course. However, an e-Learning program is much more than simply the content, just like a traditional course which is much more than the course notes and textbooks. Choosing the type of content to be used depends on the other aspects of the e-Learning program, and the pedagogy (Khurram M, 2001 ; Kalpesh H.P, 2001) that informs it. Good and pleasing content is necessary, but impressive multimedia material is not the answer (indeed may be distractive in some cases), but the answer is the use of a suitable e-Learning environment.
- Quality training, Performance and Student Satisfaction : E-Learner satisfaction is referred to as the 'how was it for you?' question! Whatever e-Learning system provided, should always ask the learners for their reactions. Include questions about the style, pace and quality of the learning.

The participants (students) were administered 2 questionnaires. The first one measured only students' performance before using the e-Learning tools and the second one measured students' performance and satisfaction. This data has been collected during the 2003 summer class. The students were asked a

series of questions to measure a number of variables in order to find quality through e-Learning tools and to conclude about their distance education experience and performance.

The survey was undertaken to investigate and promote a better understanding of the importance of degrees in the labs and readiness of e-Learning. The students were asked to evaluate the ergonomics, content, interactivity, pedagogy, and their appreciation as for the results of online-training using the 'EPC Campus'.

A total of 50 respondents between the ages of 21 and 42 years old, (61% men and 39% women) who were currently students attending the same mandatory course of computing information management and on average at the same level in there curriculum.

5. Analysis and results

When asked to assess the quality of the EPC Campus content, the vast majority of respondents agreed on the excellence of the contents as it can be seen from Table 1.

Table 1: Appreciation of EPC Campus contents

Aspect	Mean	Median	Mode
EPC Campus content	4.5	4.5	4

More specifically, students were asked to quote their appreciation of the EPC Campus to deliver EXCEL training. This training was important to succeed in an assign. The respondents expressed their satisfaction as shown in Tab 2.

Table 2: Appreciation of EPC Campus to deliver quality training on Excel

Aspect	Mean	Median	Mode
Quality training on Excel	4.46	5	5

In order to better understand the potential impact of the technical environment on the satisfaction, the assessment of the virtual campus was mandatory. It can be said that the students appreciate the EPC e-Learning approach as it appears in the following Table.

Table 3: Appreciation of e-Learning as a pedagogic tool

Aspect	Mean	Median	Mode
e-Learning as a pedagogical approach	4.58	5	5

Finally, the students were asked to assess the ergonomics of the EPC campus. The appreciation is good as the reader will see in Table 4.

Table 4: Appreciation of the Courseware Ergonomics Design

Aspect	Mean	Median	Mode
Ergonomics Courseware Design	4.38	4	4

As we can see on the Tables above, the percentages were very significantly ; more than 95 % of the respondents are totally agree and satisfied with their e-Learning labs new experience.

In the summer term 2003, 50 students passes a test on excel. 2 months later after their first experience using e-Learning tools on Excel module, students pass an exit test.

We used a paired sample test to know if is there a significant difference between the two tests ? As the samples are paired, the two-tailed test is appropriate.

Stating the hypotheses:

H_o: $m_d = 0$ (The E-Learning tool is not effective)

H_1: $m_d \neq 0$ (The E-Learning tool is effective)

The Statistical Test will be evaluated at the 1% level based on probability and the alternative is two-tailed.

Table 5: Paired Samples Test – After and Before using e-Learning

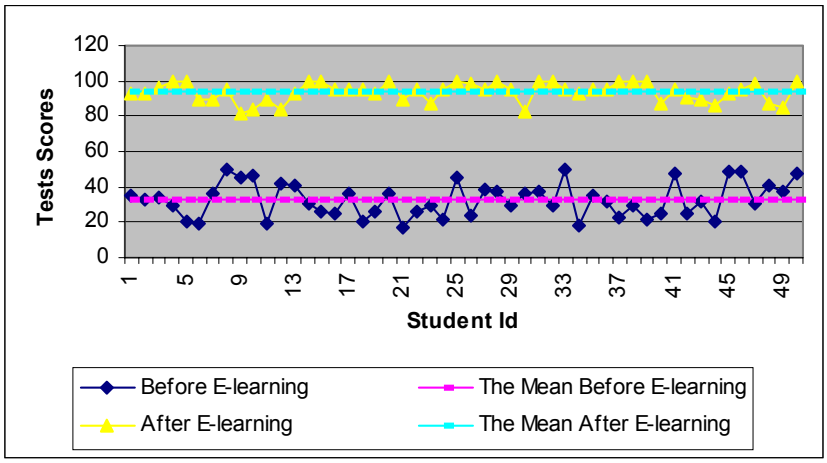
Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	99% Confidence Interval of the Difference Lower	Upper			
Pair 1	After Elearning - Before Elearnin	61,16	11,440	1,618	56,82	65,50	37,803	49	,000

Based on the Tab 5, we reject the null hypothesis because 2-tailed Sig = 0,000 <0,01. And if we use the critical value of the t-student , $t_{0,01;49}$ = 2,4049. So the Decision: Since t = 37,803>2,4049, we reject the null hypothesis H_0.

As we can see on the paired Samples Test, students performance increase with the e-Learning tool. On the other hand, students with bad scores on the first test get good and same marks on the exit test as students with good scores.

Table 6: Student performance



6. Discussion

In total, students were very interested and satisfied with their experience during the last 2003 summer class. Students have passed 2 tests on Excel. The first one before using the e-Learning tool and the second one at the end of session. Students exit test obtained good scores on Excel. Using the paired sample tests and a statistical analysis we have concluded that the students performance average increased. This new enriching experience was appreciated by the teachers, labs' staff and students as we can see on the results analysis of tests and the questionnaire.

From the teacher's point of view, management students surpassed the expected logistic benefits. Indeed, instructors understood students' difficulties and focused on the real problems instead of adopting a general approach in class. The software produced many reports on each student and on the group, allowing a better understanding of e-Learning and potentially needed adjustments.

Students have expressed their preferences for e-Learning approaches over traditional classes with graduate assistants. The most appreciated features were that each student could progress at his or her own pace.

These results are preliminary and must be considered as such, yet encouraging enough for permanent use in this course; learning uniformity among different groups becoming also possible. Further research is definitively needed but clearly, the project has already delivered greater students' satisfaction and performance and has lowered the logistics constraints on labs' reservations.

The students stated in the feedback discussions that they now find themselves able to learn without the assistance of the professor. If students did not understand something about the course, they can ask the e-Learning tools without any embarrassment and without disturbing the whole class. The survey reveals that students are very satisfied with the quality and the effectiveness of their e-Learning labs programs. At the same time, a substantial majority of survey respondents (95.6%) have made efforts to gauge the effectiveness of their e-Learning labs programs.

This work arise many questions ; on what is the educational value of remotely controlled laboratories versus traditional ones ?. In the same time, more research must be done to know if it is possible to use the new E-Learning tools to target explicit student difficulties, resulting in a higher level of student achievement?. On the other hand, future research's must be done to measure the efficiency of lab's logistics, then the reservation and student learning time consuming for courses. We need to made other tests to know if there is a difference in performance if we change the course matter (excel to access), and what's happen if we vary or change the homogeneity of e-learners groups.

In conclusion, the granting of e-Learning at University of Quebec in Montreal will bring through this technology good labs' logistics, quality and performance.

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