Interactive Pedagogy and Massification “Empirical Study”

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The training is now expanding in quantity and variety. Massification—which sank—forces universities to meet the challenge of public diversity and to justify pedagogical research. This article takes into consideration particular way of these new requirements heuristic and praxeological referred to teaching that must take into account the expectation of the learner. This work is in a descriptive and explanatory approach and aims to promote higher teaching practices through the new interactive technology tools to stimulate educational innovation within the university system. The aim of this work is the inclusion of massification to contribute to the development of a model for interactivity and effectiveness of learning. This model was developed from a theoretical approach since the state of the art and an empirical approach for several experiments. The study focused on a database C2i exams “IT and Internet certification of all learners of the Academy of Montpellier ($n = 4,254$) on the online formapro platform”. The results have shown that the success rate is highly correlated with the duration of prior self. The integration of these technologies in universities offers interactivity and learning environment for adjusting teaching practices and acquiring new skills.

Keywords: interactive teaching, distance learning, internet and computer certificate, dematerialization of certificates, massification

Introduction

In recent decades, the universities undergo many pressures to change, caused by the increase of the student audience and diversity and the impact of new information and communications technology. Added to this are the changes in the labor market that question the social relevance of university education and encourage their adaptation to a rapidly changing socio-professional environment. In the late 1990s and especially the early 2000s, the educational mutation becomes an urgent need that universities can no longer ignore and research on pedagogy of university education has been more or less intense debate (Rege Colet & Romainville, 2006). A significant number of university research highlight the effects of the introduction of various technologies on learning and interactivity. In their investigation, Docq, Lebrun, and Smidts (2008) attempted to show the link between the use of ICT and the development of interactive teaching practices. Referring to ICT, Jézégou (2010) referred to the ability to develop social interactions and create a “remote

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presence” or telepresence to promote learning. The exchanges are no longer ephemeral and tend to update the successive phases of a discussion, giving time to the thought to develop (Bruillard, 2010). The arrival of ICT in higher education also causes big changes for the profession of the teacher. The meeting of these technology pioneers and teachers was experimenting first, then developed new uses, and new practices become widespread. The case of “PORTICES” education system to information and communication technologies is interesting in this regard. Created from traditional migration over Internet (Dimet, 2005) by changes directly related to the study of learners’ uses (Popova, 2006), it remains close to the new technologies to teach but also to appropriate.

All students are now involved in the now commonplace use of IT tools, i.e., students are expected to use the computer without problem and use digital services set up by universities. The purpose of this work and its reflection are within the general framework of the introduction of ICT at university, whatever the type of education provided (or distance). In this context, this article proposes that a model, based on the literature already produced, improves design of digital teaching materials that can be both consistent with current practices of training and the current context of massification. This model was developed from a theoretical approach, since the state of the art and an empirical approach since the experiments (site of “PORTICES” C2i examinations for the mastery of computer tools...). The aim of this work is the inclusion of massification to contribute to the development of a model for interactivity and effectiveness of learning.

E-Learning: The Experience of Montpellier University (State of the Art)

The study of the introduction of technology in education has attracted growing interest in research at the universal level and takes a key position in the institutional change in the world of higher education. Several researchers have identified the role of its tools in enhancing interactivity in large classrooms, such as Smith et al. (2005); Abrahamson, Roschelle, Crawford, and Shechtman (2004); David, Mercier, Chalon, Delotte, and Berthet (2004); Gibbs and Jenkins (1992); Guthrie (2004); Aldrich, Rogers, and Scaif (1998); Hake (1998); and others studies. So, it is all known that the world society has been transformed by interactive technologies, including PCs, the web, mobile phones... The introduction of these technologies has led to new forms of knowledge representation that are representing new gateways for learners. PORTICES represents a set of innovative teaching practices: self-study tutorial, integrated data exchange, mastery by learners the tools to good use of electronic exchanges. This approach to training outside the educational model and transmissive displays systemic target acquisition situation skills, upgradeable skills in the image of today’s world. The teaching method will encourage the active engagement of learners, namely the acquisition of skills through MCQ (with voting box), case studies, and educational resources that help coming to realization.

However, the learner could adjust its own learning methodology. It is intended to produce self-study resources for the preparation (Monino & Lessag, 2005) for the “C2i”. The C2i certificate must establish mastery of skills in the “uses” of ICT through a national repository. This mastery of skills in the use of ICT will facilitate the integration into working life. It is offered in all institutions from Montpellier to all students. It is essential in some contests of the public service and becomes even staple in the professional integration of students. Seven activities grouped into seven modules—related to one or more points skill of IT and Internet

certification (C2i) level 1—are proposed, in addition of the ICTs legal aspects: Copyright, ethics, and information security in collaborative work will be taken at every stage of formation.

Since 2006, the universities of Morocco, Burkina Faso, and Senegal are through, the C2i certification, in partnership with the University of Montpellier. It is clear, therefore, that training/certification process interests many countries of the Mediterranean axis as well as many African countries (currently, there are more than 20,000 students enrolled on the platform under C2i).

Table 1

C2i Program

Unit	Contents	Points of reference
Unit 1	Manage and control the work environment	A2: Incorporate the ethical dimension and the respect of ethics B1: Appropriate the work environment
Unit 2	Effective information search	A1: Take account of the evolving nature of ICT B2: Information search
Unit 3	Using a word processing	A1: Take account of the evolving nature of ICT B4: Carry documents to be printed
Unit 4	Data presentation with charts and graphs	A2: Incorporate the ethical dimension and the respect of ethics B4: Carry documents to be printed
Unit 5	PowerPoint presentation	A1: Take account of the evolving nature of ICT B5: Make the presentation of its work presential and online
Unit 6	Creating web pages and advanced web concepts	A1: Take account of the evolving nature of ICT B1: Appropriate the work environment B3: Save, secure, and archive its data network and local B5: Make the presentation of its work presential and online
Unit 7	Electronic messaging and collaboration	A1: Take account of the evolving nature of ICT A2: Incorporate the ethical dimension and the respect of ethics B6: Exchange and communicate remotely B7: Lead projects in remote collaborative work
Unit 8	Copyright, ethics, and information security	A1: Take account of the evolving nature of ICT A2: Incorporate the ethical dimension and the respect of ethics B6: Exchanging and communicate remotely B7: Lead projects in remote collaborative work

Figure 1. C2i structure—Montpellier academy.

Regarding the functioning of the program (see Figure 1), two people are responsible for controlling all learners and each data is connected to a remote facility. In each school, there is a referent (referent and possibly an assistant) who has in its care a set of teachers. Each teacher is responsible for a group of learners. All the referees have a collaborative work platform (in which they forum, calendar, web conferencing, etc.). In the case of the Academy of Montpellier example, 58 references and 218 teachers are found.

It is noted that certification is going away in the referent of responsibility with the presence of a supervisor (which is generally the teacher) and it has contacted in the general collaborative platform, the team filing date review validation by management. Once what the date has is set-two or three days before the exam—the referent or tutor receives an array with the name of registered members, login, and passwords. The day they pass the platform review (part of the platform that is the examination center) opens and closes at a specific time. After validation of the date, this paper takes the group of learners that is in a particular platform (learning platform) and it exports that it is injected at the test center. So that by injecting the machine, it captures the username and a unique and different password for the password of the training platform. By the end of the review (two or three hours after), the manager carries out an examination session report.

Table 2

C2i Passing: Academy of Montpellier—2014-2015

Total inscribed teacher	218						
Total reported referents	58						
Number of courses per student	7						
Number of theme in seven trails	104						
Number of sessions between 01/09/2013 and 30/01/2015	271						

From 01/09/2014 to 15/01/2015	Total registered	Registered selected period	Having followed an assessment	Total time of assessment monitoring	Having trained	Total time training monitoring	Total time assessment + formation
BTS—Montpellier academy	5,974	8,262	827	367 h 48 min	1,372	2,866 h 46 min	3,234 h 35 min

Authentication and Dematerialization of Diplomas and Certificates

In recent years, many initiatives have been launched to certify the origin of qualifications. In this regard, it is interesting to recall that in 2011 the University of Montpellier and especially one of the laboratories of the University of Montpellier, Faculty of Economics (Treatment and Research Laboratory of Information and Statistics “TRIS”), pioneers have been in the fight against the falsification of diplomas and certificates. This project was made possible by the support and trust of the president of the UMSF in 2011. The idea came in the continuity of the development of the site PORTICES, funded by the Ministry of Education for monitoring the C2i certification.

Since 2011, the TRIS Laboratory in partnership with the company “QRmobile” produces and distributes “QR codes” unique and secure to authenticate C2i® certificates issued by the university (including the lifelong learning service “DIDERIS”). An agreement was also signed with the Academy of Montpellier to authenticate degrees different schools. Furthermore, in 2012, a rapprochement was initiated with the company “Authentication Industries” Montpellier (Innovation Award 2012 awarded by the Ministry of Research,

Retrieved from <http://www.authenticationindustries.com/>)¹.

If educational institutions adopt this solution, this should represent savings or make productivity gains compared to the current situation. Three major improvements include:

- Certified document becomes electronic and perhaps also easily downloaded, forwarded, and printed as needed (students, businesses, ...);
- Dematerialized, it is accompanied by a communication device (Code2D of type) that identifies and authenticates the document allowing the display of the “official” title holder on a mobile phone, tablet, or PC worldwide, anytime and without limit of time;
- The authentication of secure and diplomas that can generate additional income to educational institutions through “webservices” paying authentication;
- The systematic use of special paper or ink is no longer needed and savings are realized immediately.

What Are Its Main Benefits?

The solution includes a set of security graphics (EGS) materialized in the form of an advanced 2D barcode (Figure 2) that, unlike the prior art, brings together all of the following features:

Figure 2. Counterfeiting response.

- It is unique: code for each product;
- It is impossible to copy: All copies will be detected;
- It cannot be falsified, or regenerated, and it is impossible to counterfeit;
- It is generated by the information thus protecting and containing the information.

This information can be checked online but also offline unlike other existing off-chip technology:

- It is controlled by smartphone or desktop scanner;
- It may be income generator, control tools available to recruiters, or companies may be chargeable (dedicated iPhone application, such as subscriptions);
- Its integration with diplomas print string is simple; there is no change or addition of tasks to predict;
- This technology can be used for digital certificates or papers (see Figure 3), which certifies that:
 - The diploma is valid, it is neither a copy nor an infringement;

¹ Authentication Industries, Montpellier. Authentication industries simplified joint stock company which has been active since three years. Based in Montpellier, it is specialized in the sector of computer programming. Its workforce is between three and five employees.

- The information content of the diploma is certified (not falsified);
- The person presenting the diploma is the one who got it.

Figure 3. Getting certification procedure “QR codes”.

Proposal for an Interactive Teaching Model at the Time of Massification

Today the system of interactive boxes (see Appendix 1) has its place in education, especially to involve all students (Mercier, David, Chalon, & Berthet, 2004), this system is used differently in the field of education worldwide. The adoption and integration of this type of system in universities means more major changes in teaching practices, changing modes of communication, business, education, and learning. This tool can be a way to improve the interactivity of defined sequences, foster student motivation, collect responses instantly, and promptly inform the teacher on the level of each of them. The interactive voting boxes system contains the following basic elements:

- The input devices: The case is assigned to a computer via radio link (receiver); in this case, the box sends a signal to the receiver (flashing) by which the student verifies that its response has been well received;
- Operating system software: For creating multiple choice and launch, in addition it can receive student responses; treat form of tables and graphs. This software performs interactive activities to manage management operations after the course, recording the answers to each question; the teacher can have a list of presence of his students;
- A projection system is necessary for all systems to show the questions and response distributions.

It is not only a matter of integration (in the model) of these technologies and this system more and more sophisticated in the higher education, but rather to set up courses that lead to increased investment in learning student activities proposed to them to improve the efficiency of learning. The model can be represented as shown in Figure 4. To ensure the proper functioning of this system, the teacher must devise each session in four parts:

- First part (time T1: 25 minutes): At the beginning, the teacher must distribute boxes and computers of mobile facilities (see Figure 4). Then, in order to verify the understanding of the course, it goes interactive MCQ (10 issues with input boxes use of voting). It should be noted here that a correction and explanation of each question is necessary, because it allows the student to understand the different concepts;
- Second part (time T2: 45 minutes): The student in this part can calibrate the understanding of concepts, formulas, etc., being presented by the work and exercises with the use of computers. This generates an interactive chatting with his classmates and his teacher, allowing it to improve its engagement and learning;
- Third part (time T3: 10 minutes): In order to prepare the next class, the teacher will make a small presentation which allows students to prepare by watching the course posted on the online platform;

- Fourth part (time T4: 10 minutes): At the end of each session, the teacher presents a MCQ (or memory exercises) on the explanations made during the meeting for the second part (T2), to check their understanding (10 out issues with the use of boxes).

At the same, it should be noted that the platform of “online formapro” (see Appendix 2) is required to allow the teacher to enroll students and make their arrangements of lectures, exercises, training, and assessments. It allows him to create communities to send works and/or exercises to students, they must do their jobs and place them on the platform. To follow their commitment and see if they have done their work well, it can be used in the MCQ (input or output question).

The teacher initiates a multiple choice question (MCQ) and opens the vote; students rely on one of the buttons of their case to express their choice. These systems enforce students to pay more attention to their course. When questions are asked, there is no pressure to raise their hand, because there is a confident anonymity to answer. Teachers can have immediate stock of each of the students to distinguish the difficulties and strengths. During questioning, it can display video projection by the questionnaire and have an eye on the evolution of each of answers on his computer screen. However, it is essential to focus on the benefits of boxes in order to understand the usefulness of such a system for universities (Leclercq, 1999).

Figure 4. Interactive pedagogy model proposed.

Regard Empirical Look on the C2i Functioning at the Academy of Montpellier

Research Subject

It illustrates the remarks by the example of C2i examinations for the Academy of Montpellier. It is to present the results in order to draw elements that allow to draw conclusions about the certificate linked to the

implementation of the technological device. In reality, the objective of this study is not to conduct a detailed analysis of all the results, but more importantly, using this example to emphasize the importance of digital features.

Method and Sampling

The C2i of Montpellier University was conducted on the Richter University Campus. The questionnaire used initially contains several questions that have been revisited and updated. The questionnaire includes the five previous fields (user, computer, and Internet), with 946 modules. The platform is massively used by 57 schools of 62 in total or 91.93%. Different users of 1,536 have undergone training which is more than 2,866 hours of training. The different modules followed are illustrated in Table 1. Each school has the statistics of these students (self-training, self-assessments, and examinations). A large work requested to establishment was done (and continues) with “DIDERIS” (continuing education Directorate of the University of Montpellier) for monitoring results at the academy. Development was carried out by online to allow each school to visualize manager then uses the self-training part of the platform. This allows for a return on the relevance of the device, its actual use and if necessary, the authors can bring the support to institutions experiencing difficulties.

Results

From the data of the platform, it was found that the success rate is highly correlated with the duration of prior self. Students who have achieved self-study modules and self-assessment tests on the platform have a success rate of over 75% (BTS first and second year). Table 3 shows the results validated by domain.

Table 3

Results Validated by Domain

		Valid domains							
Results	Promotion	0	1	2	3	4	5	10	Total
Admitted	1D1 (Law)							11	11
	1D2 (Economy)							5	5
	2012-2014							314	314
	2013-2015							288	288
	All promotions 2013							620	620
Total admitted								1,238	1,238
Adjourned	1D1	20	1	4	5	8	9		47
	1D2	18		3	3	13	10		47
	2012-2014	408	70	153	157	155	93		1,036
	2013-2015	362	146	230	282	246	160		1,426
	All promotions	129	26	48	84	110	63		460
Total adjourned		937	243	438	531	532	335		3,016
Total		937	243	438	531	532	335	1,238	4,254

Success rates are generally low 31%, over 60% of students having a session already validated between five and seven modules (out of 10 required). The results were basically very satisfactory regarding the organization and conduct of exams (still some problems related to insufficient Internet speed problems in some high schools having necessity of rescheduling a replacement session) (Figure 5).

Figure 5. Total admitted and adjourned by high school.

Discussion

Since December 2013, new case studies have further complemented existing random lots. The pursuit of a remarkable development work was carried out by “online formapro” to develop its modules and give a very professional appearance (in flash): creation of “simulators”.

These few elements of analysis allow for an overview of the ownership of the device and to highlight the responsibilities of each stakeholder for the development of the training. A work of continuous improvement is underway in connection with the events encountered and emerging needs, in particular, as followings:

- Implementation of new procedures and validation (collaborative documents, emails, and web conferences) as a detailed protocol for optimizing relationships rector/university and efficiency of all;
- Realization and analysis of a qualitative online survey from late December 2013 C2i referents to adapt the device and to organize content and participants in training session’s referents (Retrieved from https://docs.google.com/forms/d/1Ciss_muByIj3S6SDV9hNcrF8vcG09znDIr-lGojfQNs/viewform);
- Implementation and updating of synthetic media (diagrams events/results) and tools to enable “inputs shifted” in the academic system and to enact relevant single procedure for all (Retrieved from <http://webpeda.ac-montpellier.fr/economie-gestion/?C2i-2012-2013-Dispositif-d>);
- Working with DIDERIS on developments of the device because of its success: new enrollment management for all major automation students (session management, generation’s identifiers, generation, and dissemination of results of examination sessions);

- Working with DIDERIS and OnlineFormapro (service provider) on improving the sessions and introduction of “simulators” (professional flash animation solutions) as well as the generation of examination scripts.

Conclusions

The massification of education, the development of digital tools, changing attitudes, and mentalities are all challenges. The teachers themselves must adapt to a new audience, more and more heterogeneous; the relationship to knowledge and learning has evolved. The question that arises today is that actors of education are not related to the introduction or not of digital technology in education, but it is how to apprehend and control it for irrigation in better direction. The essence of the fundamental principle is the need to encourage interaction and reflection of the learner. The skills expected of a university education are therefore an exchange value and a guarantee of quality. Does a course with a remote monitoring involve the development and respect a rigorous process that uses a factor of all to build, animate, and evaluate the process for better feedback to both teachers and students? As part of the preparation for the C2i, they want to use more extensively this type of device to allow greater interactivity between learners and teachers. There are also passageway extension projects of C2i internationally; this project is called C3i: “IT and Internet certification at international”. Synchronous methods allow an extremely interesting reactivity in all the players who find themselves in situations of remote exchanges without the constraints that same distance. Therefore, the use of digital tools is essential for an innovative university environment. Communicational or relational knowledge or teaching skills and techniques are emerging as complementary and essential skills to teach. Therefore, the highlighting of new training approaches and upgrading both the teacher and learner are part of the new task of the university system in order to enter the new era of modern education and innovative. Digital tools are interconnected into an opportunity, especially for expanding access to quality education.

References

- Docq, F., Lebrun, M., & Smidts, D. (2008). À la recherche des effets d’une plate-forme d’enseignement/apprentissage en ligne sur les pratiques pédagogiques d’une université: Premières approches. *Revue Internationale des Technologies en Pédagogie Universitaire*, 5(1), 45-57.
- Bruillard, E. (2010). Formation à distance: Dispositifs techniques. Structuration organisationnelle, spatiale et temporelle des environnements. *Distances et Savoirs*, 2, 207-221.
- Jézégou, A. (2010). Se former à distance: Regard sur les stratégies d’autorégulation environnementale d’étudiants adultes. *Savoir*, 24, 79-99.
- Monino, J. L., & Lesage, M. C. (2005). *Réussissez le C2i*. Paris: Ed Dunod.
- Rege Colet, N., & Romainville, M. (2006). *La pratique enseignante en mutation à l’Université*. Bruxelles, Belgique: De Boeck.
- Abrahamson, L., Roschelle, J., Crawford, V. M., & Shechtman, N. (2004). Advancing research on the transformative potential of interactive pedagogies and classroom networks (CATAALYST workshop report).
- Aldrich, F., Rogers, Y., & Scaife, M. (1998). Getting to grips with interactivity: Helping teachers assess the educational value of CD-ROMs. *British Journal of Educational Technology*, 29(4), 321-332.
- David, B., Mercier, F., Chalon, R., Delotte, O., & Berthet, J. P. (2004). *Amphi interactif: état de l’art et projet DRIM-AP* (In actes des Premières Journées Francophones: Mobilité et Ubiquité 2004, Nice-Sophia-Antipolis, France).
- Gibbs, G., & Jenkins, A. (1992). *Teaching in large classes in higher education, how to maintain quality with reduced resources*. London: Kogan.
- Guthrie, R. W., & Carlin, A. (2004). Waking the dead: Using interactive technology to engage passive listeners in the classroom. Proceedings from the *Tenth Americas Conference on Information Systems*, New York. Retrieved from www.mhhe.com/cps/docs/CPSWP_WakindDead082003.pdf

- Hake, R. (1998). Interactive engagement versus traditional methods: A six-thousand-student survey of mechanics test data for introductory physics courses. *American Journal of Physics*, 66(1), 64-74.
- Leclercq, D. (1999). Votes en amphithéâtre électronique pour animer de grands auditorios universitaires selon 6 paradigmes d'apprentissage/enseignement (In actes du 16ième colloque international de l'AIPU, 1999, Montréal : HEC, tome II).
- Mercier, F., David, B., Chalon, R., & Berthet, J. P. (2004). Interactivity in large class using wireless devices. Proceedings from *MLEARN 2004*, Rome, Italy.
- Smith, A., Stewart, R., Shields, P., Hayes-Klosteridis, J., Robinson, P., & Yuan, R. (2005). Introductory biology courses: A framework to support active learning in large enrollment introductory science courses. *Cell Biology Education*, 4(2), 143-156.
- Dimet, B. (2005). *History of the transformation of a distance learning course—The case of the creation of the ICT C2i PorTices module FIS 2005, symposium educational institutions face the digital* (House of Human Sciences Paris-Nord, Carré des Sciences, Paris, France).
- Popova, B. (2006). Usages imagined, anticipated, expected, ... possible uses, staffing, future ... Real uses of ENT-LR -University of Perpignan, ENTICE project (the investigation elements—2006). Proceedings from *Symposium “Innovations, Uses, Networks”*, Montpellier, France.

Appendix 1. Interactive System Operation

Appendix 2. Online Formapro