

Does technology transform teaching? The paradoxical appropriation of an e-learning platform.

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ABSTRACT

E-learning tools have proliferated and are being used today in a way which their backers could hardly have imagined. Moodle, the free software e-learning platform, has been available at the College of Technology in Toulouse since 2005. Our work aims at questioning the appropriation of this tool by its users, that is the teachers and the students. Two years after its implementation, our study shows that, although students appreciate the platform and despite its undeniable technical features, many teachers still make no use of it. How can this phenomenon be explained? Our hypothesis : the modes of appropriation and the uses of technical objects depend, amongst other things, on the representation, interaction and power-play between the people involved.

Keywords: ICT, Moodle, appropriation, e-learning

1. INTRODUCTION

The internet, the electronic mail system, forums, self-study CD-ROMs, e-learning platforms... Within the past few years, those involved in the education process have seen a whole new generation of communication tools emerge – all those belonging to the information and communications technology (ICT¹) family.

In many professional discourses today, the most widely spread idea is that the diffusion of ICTs means faster working, greater teaching efficiency, collaborative work and rationalization of organizations [11]. ICT tools are often considered to be “*magic wands*” [15] used to share, communicate, teach and work collaboratively in a better way. They are often imposed through a top-down decision-making process by a hierarchy looking for

interdisciplinarity and efficiency. Yet, their actual deployment and use are often far from being the ones planned for initially [12]. We suggest that e-learning tools, which are considered to be objects of mediation between teachers and learners, are one of the most relevant means of analyzing educational organizations.

At the IUT ‘A’² in Toulouse, an e-learning tool has been available since September 2005. Our work aims at questioning the appropriation of this tool by its users, that is the teachers and the students. This question turns out to be all the more important since whatever the inherent technical performances of the chosen platform may be, the latter exists if and only if potential users actually make use of it. A first research carried out within the department of Electrical Engineering and Industrial Data Processing (GEII³) in this College [2] showed that Moodle is used only by a minority of teachers but that it is greatly appreciated by students. There is not a total appropriation of the platform and the absence of use amongst many teachers is particularly significant. What are the resistances towards ICTs in general and more specifically towards e-learning tools? How do actors take part in the process of appropriation and animation of such tools? The organisational, teaching, commercial and technical implications linked to these questions have their importance. We hypothesize that the modes of appropriation and the uses of technical objects depend, amongst other things, on the representation, interaction and power-play between the people involved.

In our first part, we will present Moodle and what is at stake in the appropriation of ICTs in general and of this e-learning platform more specifically. Then, we will deal with the

¹ In this article, the abbreviation ICT will designate all digital media including the Internet, Intranet, Enterprise Resources Planning (ERP) software, e-learning platforms ...

² IUT stands for “Institut Universitaire de Technologie” which is the equivalent of a College of Technology. The IUT ‘A’ is part of the scientific university of Toulouse called “Université Paul Sabatier, Toulouse 3”.

³ GEII stands for “Génie Electrique et Informatique Industrielle”. It is one of the departments of the IUT ‘A’.

appropriation of this tool by the teachers and by the students in a College of Technology department. Finally, the last part sheds light on the paradoxical appropriation of an e-learning platform and suggests clues for an explanatory hypothesis.

2. THE APPROPRIATION OF AN E-LEARNING PLATFORM

The aim of the first part is to introduce Moodle and its integration within the Electrical Engineering and Industrial Data Processing department in the IUT 'A' in Toulouse, France.

What is Moodle?

Moodle is an e-learning platform, also known as a course management system (CMS), used to create online learning communities based on teaching material and activities. In order to create a real online learning environment, Moodle has associated a content management system to pedagogical and communication functions. Therefore, this platform can create a network around teaching resources, hence favouring interaction between teachers and students. Moodle is both flexible and reasonably user-friendly. It includes forums, resource management (multimedia files, mathematical expressions...), online quizzes, activity reports and ready-made modules, all available in sixty languages.

This platform, which allows for a real implementation of either distance or blended learning and which has been available since 2002, has two specificities. First of all, it is based on a constructivist approach to education using open source software. Moodle's creator, Martin Dougmias, holds that knowledge is "constructed" actively by the learner and not "transmitted" passively via books or by listening to someone⁴. Being an electronic learning environment, Moodle must enable learners to build their own knowledge using their experiences and skills. Secondly, it is coded in a specific free computing language - PHP - and used in a LAMP environment, that is to say a bundle of free software used to run servers. Contrary to closed software, anyone can be involved in the development of Moodle. Many communities have been created around different themes and are structured in forums hosted on the following site: <http://moodle.org>. The current version of the platform has in fact been greatly influenced by its participants (whether they be administrators or educationalists).

According to the Moodle statistics site (<http://moodle.org/stats>⁵), there were, as of November 2007, more than 35,000 organizations (schools, training centres, universities, etc.) registered in 196 different countries, 1,500,000 courses available and more than 15,000,000 users including 1,800,000 teachers. Seventy three organizations have more than 20,000 users. At the IUT 'A', Université Paul Sabatier, Toulouse, France, the e-learning Moodle platform has been available since the end of 2005.

Moodle in the IUT 'A' Toulouse

The DUT⁶, which is a 120 ECTS undergraduate qualification, can be obtained after two years of study in a College of Technology (IUT). The 115 Colleges of Technology spread across France offer twenty-four specializations (sixteen in the industrial sector and eight in the service sector) as well as seven hundred different specializations at degree level. Every year,

131 000 students are trained in these Colleges in which there are between 1620 and 1800 hours of theoretical and practical teaching taking place over a period of sixty weeks. Students also have to do personal projects which take up an average of five hours per week and to accomplish a work placement of a minimum of ten weeks.

The IUT 'A' is one of the two Colleges of Technology which are part of Toulouse's scientific university. It comprises sixteen different specializations grouped in what are called "departments". These sixteen departments are spread over four different geographical sites: ten departments are present on the two sites in Toulouse (in the south west of France), three in Auch (80 kms west of Toulouse) and three in Castres (70 kms east of Toulouse). Close to five thousand prepare their two-year diploma there. The Electrical Engineering and Industrial Data Processing department is located on one of the two Toulouse sites and was created in 1967. Every year, one hundred and fifty students graduate from this department with a diploma. The GEII DUT is a national diploma delivered by fifty-three other departments throughout France, and in French Guyana. Its aim is to prepare students to become highly skilled technicians in the domains of electronics, automation and industrial data processing. A graduate student is able to analyse and participate in the design of systems or equipment using analog, digital or power electronics, automation, industrial data processing and industrial local networks. Electronics, micro-electronics, automation, local networks and data processing being present in very many sectors of activity, the skills of a GEII graduate are welcomed in domains as varied as aeronautics, transport, manufacturing and agro-alimentary industries, etc.

The Moodle platform has been available at the IUT 'A' since September 2005. It was set up as a result of "*the will of the hierarchy to integrate TICE⁷ into the everyday teaching task of all teachers and not just to use them for distance teaching or for very specific types of students*" [2]. To reach this objective, a specific cell ("Médi@tice") was created, whose aim was to help teachers to "mediate" their teaching material. Two ICT representatives were named, an assistant-engineer was recruited, training sessions for all the staff were set up, and teaching projects based on the platform were financed. By June 2007, 200 out of the 350 permanent teachers had opened an account on the platform, and one hundred were active. The regional platform (which combines the 4 sites of the IUT 'A' as well as the IUT in Tarbes - 160 kms south-west of Toulouse) had 6000 registered people of whom 2500 had connected to the platform in a "significant" way (more than 50 logs⁸). 750 courses had been created and 280 of them had more than 500 logs. In total, 1.5 million logs were registered in less than two years after the implementation of the platform [2]. There are, however, striking disparities between the sixteen different departments of the IUT 'A' Toulouse: for ten out of those sixteen departments, the use of Moodle has been sporadic or even nonexistent. The GEII department is in fact the most active with the highest number of regular users. There, all the computer rooms, language laboratories and offices are connected to Moodle.

This being the context, it is important to cast an eye on how the teachers and students of this department perceive and use this newly available tool. This pragmatic question is all the more

⁴ See <http://docs.moodle.org/en/Philosophy> for further information.

⁵ Last consulted on November 18th, 2007

⁶ DUT stands for "Diplôme Universitaire Technologique"

⁷ In French, a distinction is made between "TIC" which refer to ICTs in general, and "TICE" which refer to ICTs applied to education

⁸ A log is any request on the server: file downloading, answer to a question, etc.

important as it opens the way for broader questioning of the appropriation of ICT in society as a whole.

3. THE APPROPRIATION OF AN E-LEARNING PLATFORM

Having introduced what is at stake in the appropriation of ICTs, we will now have a closer look at the appropriation of the Moodle platform (an ICT tool) by the teachers and students of GEII at IUT 'A' in Toulouse.

Of the appropriation of ICTs

Other authors have thought about the problems linked to the appropriation of technologies in general and more precisely of e-learning platforms. For instance, P.S. Goodman in *Technology Enhanced Learning. Opportunities for Change*, Mahwah (2001) or J.J. Duestadt in *Higher Education in the Digital Age: Technology Issues and Strategies for American Colleges and Universities* (2002). But, our approach can be said to be innovative as it adapts a constructivist epistemology. Indeed approaching objects only in their technical dimension and avoiding the social or human question is problematic. Technology is first and foremost the product of the human rational, of intelligent thinking [3]. It mobilizes a set of means with the aim of accomplishing a certain number of actions. The technical object is therefore, above all, the expression of a link between human beings. From our point of view, the scientific approach to technical objects must always include a systematic description of their human uses. Hence we suggest distancing ourselves, in the present article, from the technical, managerial, speculative or even fantastical discourses often associated with ICTs. With this in mind, we will try to determine what the individual actually does with the technical object. The question of appropriation seems, consequently, both to come first and to be central. The verb "to appropriate" means "to make one's own". But the appropriation process is mostly an uncertain one in which the user tries to overcome the constraints on a given object in order to accomplish a project. The appropriation process consists above all in a double movement of assimilation and accommodation [16]. It presupposes a cognitive and minimal technical mastering of the object (thus implying pre-existing know-how), a social integration of its use in everyday life and a possibility of creation [17]. Appropriation is at the same time an inscription in culture [6], an adaptation to the needs and uses of the user [8] and an assertion of his/her identity. For the individual to adopt a technology, he/she must inscribe it in his own personal trajectory. Appropriation, then, becomes the result of a process by which use has been constructed [17], and asks the question of meaning for its user. Beyond this individual appropriation of technologies, the question of collective appropriation is also asked. As it cannot be reduced to the sum of all the individual appropriations, collective appropriation proves a more complex phenomenon. For this reason, after having identified its users, we will question their individual appropriation of Moodle.

Studying the 'user and its use' of an object is the main focus of *Human-Computer Interaction* (HCI) approaches whereas the study of 'the user and its usage' takes into account the larger social environment which encompasses interactions between humans and machines [17]. In this work, we will refer to 'user' in the context of his/her social environment⁹.

⁹ In French research papers, there is a clear distinction between the terms "usage/usager" and the terms "utilisation/utilisateur". Research papers written in English do not seem to have such a clear distinction

We postulate that a human agent interacting with a computer carries with him/her a whole history and that his/her action is ingrained in a specific social situation. Within the considered College of Technology, we will schematically distinguish two types of Moodle users: the teachers and the students.

The appropriation of Moodle by teachers: the case of English in GEII

In the GEII department, the expansion of Moodle is due to a few active teachers, including one of the two people responsible for TICE at the IUT 'A' and one of the two permanent English teachers. The head of the IUT 'A' has consented to huge human and financial investments in order to support language teaching. The department has three multimedia language laboratories at its disposal, equipped with the appropriate material (computers, head phones and microphones, servers, etc.) and the software needed to create multimedia courses designed for language learning in the laboratory and transferable onto the Moodle platform. The language teachers were trained for three weeks and were taught not only about the technical aspect of it all but also about the pedagogical implications of using multimedia tools.

In the past two years, apart from links to external files (worksheets, corrections, sound or video files, etc.), Moodle has been used as a blended-learning tool: lessons, submissions by students, use of glossaries, forums, quizzes... For example, at the beginning of the school year, all the new students of the department (about 160 students in the first semester) take a language test which is automatically corrected using Moodle. Another example is the revision of the main grammatical points of English via interactive tests (with feedback) and assignments. Moodle also enables students to recreate a multimedia laboratory in their own homes (all they need is a computer with an internet connection and headphones). "Le présentiel amélioré¹⁰" allows students to work on extra exercises in total autonomy, anytime anywhere. They can question teachers via forums and this reassures students as it makes them feel they have continuous support. This type of working practice participates in giving each student some sense of responsibility.

These two years spent experimenting Moodle in English teaching have resulted in a globally positive assessment. In terms of work organization, the platform encourages course-content planning, homogenisation of classes, reduction of the number of teachers' meetings and immediate access to all the documents needed from anywhere on the IUT 'A' site. Lacking an expert system of analysis, it is difficult to answer the question of Moodle's pedagogical efficiency in scientific terms. However, the system undoubtedly helps in providing class-groups of homogenous levels, in respecting each student's learning pace and in managing the different language skills of each individual within the class. Being able to expose students to sound or video files that have been prepared by the teacher favours an improvement of their oral comprehension skills, and interactive exercises make students more active. Contrary to what some might have feared, it seems that leaving files on Moodle and enabling students to work at distance does not encourage truancy. Quite the contrary, it obliges absent students

and often propose the terms "user/use" for both sets of words. In this paper, we have chosen to distinguish those sets of terms by using the terms "user/usage" and "user/use" but these translations remain unsatisfying.

¹⁰ "Présentiel" means "classroom-based teaching". For "présentiel amélioré", ICTs are used either before or after the class as a way to supplement the course.

to be up to date with the coming class session. In terms of work load for the teacher, posting documents on Moodle does not require any transformation of the given document or any specific technical knowledge. Corrections often take up less time since some tests are automatically corrected. Of course, teachers still have to assess students' progression and help them work on specific problems. A final point, an environmental argument if ever there was one, Moodle means a considerable reduction of the number of photocopies made.

The main disadvantage lies in the time spent preparing some courses, especially those meant for "présentiel allégé"¹¹. For example, it is impossible to tally the number of hours spent in the preparation of the course "English Grammar: tense revision". A group of three teachers regularly worked on it for a year. But the fact that it can be mutualised, used and reused amply compensates for this heavy initial work load. In the end, Moodle does not seem to modify the fundamental relation between the student and the subject matter. The grade remains the main motivation for a student to log onto the platform and invest time and energy there (18,000 logs for the course on "tense revision" for which they get a grade and 3,300 logs for the course on "technical English" for which there is no grade – the number of logs having been recorded over the same period of time with the same students).

The appropriation of Moodle by GEII students

When they first arrive in the department, every student gets an individual computer account allowing them to access the intranet (therefore Moodle) and the internet. They also have a space on the server on which to save their personal data. By June 2007, 315 students had registered on Moodle and 200 of them had regularly logged onto Moodle every month. Altogether (students and teachers), between fifteen and twenty thousand logs had been recorded per month. In a recent study [2], the results of which still need to be validated by a more rigorous quantitative approach, Moodle seems to have become a natural working tool for students. The students interviewed, whose culture is ingrained in computing, show a definite interest for this type of resource. Depending on the subject matter, between 70% and 80% of them feel that the online resources are "quite useful" or "very useful" to prepare for exams. From 70% to 80% think that it has helped them to get better results (while fewer than 10% think that it has "not helped them at all"). Moodle courses containing informational content seem to be very popular and encourage students to log onto the platform regularly... files containing their grades seem to have the same effect! Students wish to see more courses on different subjects posted on Moodle (as of today, twenty eight courses are open and twenty two regularly consulted) and they regret not being able to access the platform more regularly, because they lack the equipment (this despite the computer rooms set up for them in the department) or the time.

Overall, it can be said that the introduction of Moodle has been positive both for the teachers that have invested the platform and the students that have been using it. Still, despite several training sessions and repeated incentives, in June 2007 only fifteen teachers per month were logging onto the platform [2]. Half of the fifty permanent teachers in the department did not have a Moodle account, remained indifferent or clearly opposed it. While the first experimentations show the interest of such a tool, how can we explain the paradoxical behaviour of some teachers

and, especially, the non-use or, even, the rejection of a tool such as Moodle?

4. THE PARADOX OF ICT APPROPRIATION

Numerous researchers (Norbert Alter, Crozier et Friedberg, Bernoux...) have shown that a technical object, whatever its performances may be, does not always bring about a change in the habits of the actors in place. How can this phenomenon be explained? We suggest studying the way in which the actors participate in the appropriation and animation of Moodle as well as the way in which they in fact respond to managerial perspectives and demands. We hypothesize that the modes of appropriation and the uses of technical objects depend, amongst other things, on the representation, interaction and power-play of the people involved.

Clues to reading the appropriation of ICTs in organizations

How does a social entity decide to adopt, adapt, use and develop a given technology? What are the phenomena involved in a process of collective appropriation? An organization can be defined as a concrete system of actions, a set of games, in which participants are actors, and which define the real goals of the organisation as well as the way in which the latter deals with daily concrete problems and coordinates its members' actions [4]. A collective action initiated by the organization's hierarchy – for example, the setting-up of an e-learning tool – cannot be explained nor understood unless the representations, the interactions and the relationships of power between the actors in place are taken into account.

The appropriation of a technical object is linked to the actor's **representation** of it. It depends on the actor's personal project and symbolic world. It asks the question of meaning for the user. The individual's representations evolve with his/her definition of the situation, with the collective projects in which he/she is involved and with his/her relationships or social system. The usage of a technical object must therefore always be considered "in situ". Technical objects, in the end, depend on a social definition of the world in terms of norm and positioning. The question of representation is all the more important as it can induce a misappropriation [7] or a misuse [15] of the technical device.

Collective appropriation also depends on the fixed **interaction** within the group and on the way the technical object modifies it [3]. E-learning tools penetrate the existing interactions between teachers, between students as well as between teachers and students. The appropriation of a platform changes interaction and social organization. Interactions influence, amongst other things, collective learning, which is the condition of a new "game" in the sense that Crozier and Friedberg [9] meant it.

If individuals are constrained by and within an organizational context, all Organizations are subject to their actors' room to manoeuvre [5]. The latter do not mechanically respond to the injunctions of their hierarchy. Unpredictable zones of free will allow them to exercise a certain **power** over individuals who feel uncertain [9]. Each actor therefore develops his/her own strategies in order to control more and more zones of uncertainty so as to increase his/her impact. The game deriving from this (refusal, negotiation, avoidance...) allows for the adjustments needed so that the organization works well but can also have a negative impact. Any technical modernisation must therefore go along with some acceptance of its necessity on the part of the user and « *this acceptance is what constitutes change* » [5].

¹¹ For "présentiel allégé", multimedia-based tutoring replaces a certain number of hours of classroom-based teaching.

Moreover, in a given situation, the game of individuals (the use or not of a tool for example) bears meaning, and even sends more or less explicit messages to the backers.

Hence, collective appropriation of technologies seems both uncertain and negotiated. Interpreting ICTs in general and e-learning tools in particular requires understanding the contexts and the actors' strategies, confronting different points of view and identifying the logic behind actions.

A reading of the non-appropriation of Moodle within the GEII department

Despite many training sessions and incentives from the IUT 'A' hierarchy, the platform is still very much under-exploited because of a refusal by many teachers to post material or due to minimal involvement on their part. As "complete observers"¹²[10], we had the opportunity to observe a certain number of practices and to collect a certain number of remarks by the teachers who do not participate in Moodle. Thus, we were able to list comments linked to representation ("*this thing will never help the weakest students improve*"), interaction ("*with this kind of platform, in a few years, we won't need teachers anymore!*") and power play ("*Moodle is a whim from the hierarchy*"). As we can see, the tool comes up against the status, logic and practice of the actors in place. The (non) usage of the platform seems linked to the state of mind of the given teacher and to the meaning he/she gives to the artefacts he/she encounters. The interpretations and reactions to the hierarchy's incentive are all the more significant as the status of teacher is characterized by an "*ambiguous autonomy*" [14], teaching freedom and the absence of strong top-down relationships (especially in universities).

Moreover, teachers certainly willingly exchange what they feel are 'good practices', but are a lot more reluctant to share course documents that they have prepared by themselves. Pedagogical resources are at the very heart of the profession and are often the result of many years spent thinking, teaching and even doing scientific research. These resources enable the teacher to position him/herself as "a specialist to be reckoned with". Because Moodle potentially makes it possible for anybody to read, copy or digitally diffuse content, some teachers fear their work will be plundered, they may lose teaching hours, or be exposed to critical judgement. Like Phythagoras who forbade his disciples to disclose his demonstrations, teachers often hide their pedagogical resources from their colleagues while massively giving them out to students.

In the end, some teachers may prefer to develop strategies of avoidance or impoverishment. Still, the setting-up of an e-learning platform is an opportunity to create new "*game rules*" [13]. Little by little, the teachers who feed Moodle indeed modify interactions and, by so doing, collective norms. The combined pressure of both students and colleagues may lead other teachers to visit the platform, register and then, participate collectively. Here, change must be considered as a long drawn-out sociological process.

Capitalizing experimentations, pedagogical observations and practices, hosting online communities of teachers, production of resources... the process must be progressive and favour "*the freedom to cooperate, collaborate, mutualise and exchange*" [1].

5. CONCLUSION

Whatever its objective intrinsic qualities may be, it is impossible to forecast how technical objects such as e-learning tools will really be used. The study of only one type of environment does not allow for a broader generalisation of our results. It has however enabled us to establish that Moodle reveals interactions, representations and power-plays amongst its users. Its conception, appropriation and use show the strategies put in place by the actors, whether is be individually or collectively. This preliminary approach and the explanatory hypothesis suggested are to be validated by an empirical study within the IUT 'A'.

The e-learning platform Moodle is an opportunity to encourage latent organisational debates as the hierarchy's demands and the practices of both teachers and students come face-to-face. However, underlying power struggles remain socially invisible [18]. Instruments of 'power' or of 'change', e-learning tools are also supposed to be, for those who use them, a privileged moment of reflection on their own actions and logic, and, in a way, a moment to question the context of collective action. Beyond the myths usually engendered by ICTs, their development and diffusion allow for the creation of communities of practices and facilitate the production and transmission of collective knowledge which can, in turn, form the basis of improved professional skills. A future research should enable us to suggest ideas to support the appropriation of such an e-learning platform.

6. REFERENCES

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¹² That is to say, first and foremost, as professionals who observe.

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