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Is internet an acceleration factor in informal voluntary lifelong learning?

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Is Internet an acceleration factor in informal voluntary lifelong learning?

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Key words: informal learning, lifelong learning, e-learning, Internet, knowledge, quantitative methodology

Abstract

IT technologies are said to make access to learning easier and cheaper. Virtually all theoretical knowledge is available in one form or another on the web, with possibilities for beginners as well as, in certain cases, for extremely sophisticated users. This availability throws into question the way we learn, especially the younger generation, those having been born with these technologies. This article contributes to this debate, surveying an undergraduate population of 139 students on their learning strategies regarding not only academic theoretical knowledge, as it is traditionally analyzed, but also by studying the different kinds of knowledge that is accessible on the Internet (non-academic theoretical, as well as hands-on learning in all of its varied forms). We use data analysis techniques (Multiple Correspondence Analysis and a cluster analysis). These methods allow us first to identify four structuring factors of online informal learning in relation with Internet use (perceived need to learn hands-on knowledge; degree of satisfaction with online learning outside studies; type of online learning practices; Internet learning practice dexterity) and then to propose a typology of learning behaviors that thus allows us to show the impact of Internet use. We show that Internet use seems to create "multiplier" effects on online informal learning and that this phenomenon is greater for hands on knowledge learning than for theoretical knowledge learning for the student's studies or outside of their studies.

The spread of IT technologies has dramatically reshaped the structure of our economies, and today, manufacturing jobs and industries are no longer the major asset in global competition for developing countries that they once were. Today, to quote the OECD, "knowledge workers [...] are increasingly pivotal to economic success in developed countries" (OECD 2007). This has a two sided consequence for lifelong learning. To stay in this knowledge race, people, firms and countries have to increase their investment in training. But, as noticed above, IT technologies are said to make the access to learning easier, cheaper. Virtually all theoretical knowledge is available in one form or another on the web, with possibilities for beginners as well as, in certain cases, for extremely sophisticated users. Effectively, nowadays, it seems that any and everybody can learn about almost any desired subject in an easily accessible way. The Internet is a significant source of an increasingly diverse body of knowledge, a sort of "one-stop shopping paradise" for those seeking to learn: theoretical knowledge like foreign language or music theory or practical, hands-on skills. A few examples might include someone seeking guidance concerning a cooking recipe, an individual attempting to solve a technical problem related to his personal computer or someone needing to repair his washing machine.

In light of these developments, scholars have started to debate if this new learning media changes the way people learn, and especially how it can impact the teaching process. Following Brown (2002), it has been argued that the most recent generations, who since their birth, that have grown up with computers, the Internet, mobile telephones, and the services offered by the convergence of these three media, (and are as a result called "digital native") may learn differently and thus use digital technologies differently to learn (Ezziane 2007). In this work, we will observe the generation immediately preceding the "digital natives". For us

the “Y generation” is in a unique position considering its age, and thus is likely to have already accumulated multiple and various learning experiences.

Coming back to previous academic literature, it has generally looked at a specific kind of knowledge, i.e. theoretical, or “academic knowledge”, transmitted by schools in our countries, and mainly based on written supports and interactions between teachers and pupils (cf. the issue of Réseaux dedicated to this theme and coordinated by A. Ben Youssef and A. Rallet). This literature has adopted a vantage point in an institution or a group of institutions and has taken the point of view of the learning produced by this institution. But other knowledge exists and may be as relevant as theoretical knowledge for lifelong learning, that being “non-academic hands on knowledge” or “non-academic theoretical knowledge” which we will describe later in this work. Here we adopt the point of view of the learner, taking into account the globality of his online learning.

Can we say that access to the Internet, which spreads knowledge at the feet of any user, allowing them the possibility to freely pick among the available riches is a general and uniform factor of knowledge diffusion? Or, is the Internet media better suited to certain types of learning and less for others? As Brown (2002) remarked a new media has never replaced an older one, but rather reshaped its use. This question only makes sense when posed in reference to a population having access to the Internet, therefore we do not consider any questions related to Internet access. On this basis, among those having Internet access, can it be said that all users learn in the same manner and with the same effectiveness? And, especially amongst these students (the “Y” generation, or “Milleniar” generation, those who were born concurrently with the Internet), is the simple use of the Internet enough to allow them to benefit equally from the online learning facilities? Or does highly effective Internet use (frequency and quality) support improved learning (quantity, quality and satisfaction as judged by the learner)?

We take on this question by surveying students concerning their practices regarding online learning, leading us to develop a typology of learning behaviors that allows us to show the impact of Internet use. By choosing a student population we have access to a generation of individuals who, a priori, are open to new technologies like the Internet and should as a result be more homogeneous relative to Internet behavior and overall Internet vision than if we took a mixed generation sample. This study explores the effect of the degree of internet use on the effectiveness of voluntary online lifelong learning from the standpoint of the learner, but without any particular emphasis on socio-demographic issues. By limiting our study to university students, we effectively minimize external factors that could otherwise influence learning.

The paper is structured as follows. The first section specifies the general context of the study: we define our work object and investigate how this subject has been dealt with in the literature. We then describe in the second section our methodological process before presenting the sample. The third section shows our results. Initially we refine the subject with descriptive analysis, and then, with data analysis techniques we identify the factors which structure learning via the Internet, examined from the viewpoint of Internet use. The final result is the emergence of a typology of learning behaviors that allow us to show the impact of internet use. A final discussion concludes this study.

Theoretical framework of the study

First we will look at and define our study object before briefly describing how this subject has been dealt with in the literature.

Definition of study object

Learning, types and domains

Learning is the process by which we acquire new knowledge, behaviors, skills, values, preferences or understanding. Human learning may occur as part of education during studies or as result of personal development outside of the formal academic framework.

Formal learning takes place within a teacher-student relationship, such as in a school system. Non-formal learning is organized learning that takes place outside of the formal education system. Informal learning occurs as a result of day-to-day experiences. In this paper, we focus on informal learning, how people learn things voluntarily (i.e. of their own free will), for their studies or in addition to the same.

Learning is organized in three domains described in B. Bloom taxonomy below (Chapman 2006): the cognitive domain (intellectual capability, i.e., knowledge, or "think": to recall, to analyze, to problem solve); the affective domain (feelings, emotions and behaviours, i.e., attitudes, or "feel": to like, to hate); and the psychomotor domain (manual and physical skills, i.e., skills, or "do": to cook, to ride a bike). These domains are not mutually exclusive.

These three domains of learning can be combined with another classification (with sub types), whose first two types were described by John Anderson (1976): basically, traditionally, cognitive sciences distinguish three types of learning depending upon the type of knowledge concerned. Declarative knowledge corresponds to theoretical knowledge. It is based on facts, rules or principles. This knowledge is mainly static and non contextual. This sort of knowledge alone does not permit action on the real, and must be translated into process to allow action. This is the object of the second category of knowledge. Procedural knowledge refers to the "how" of the action, to the different stages of realizing the act, the hands on knowledge. This knowledge is mainly dynamic and exists in a context. Conditional knowledge is strategic knowledge which lets us decide when and why (in which context) to undertake the act in an appropriate way. They permit us to apply declarative and procedural

knowledge in different contexts. In this study, we principally and explicitly take into account cognitive and psychomotor domains of declarative and procedural knowledge.

Autonomous voluntary learning, Lifelong learning

Because autonomous learning is a school of education which sees learners as individuals who can and should be autonomous i.e. be responsible for their own learning environment, here we prefer to use the word voluntary to refer to learning that is not an obligation, not organized by any institution or group, but is freely and voluntarily engaged in by the learner.

In 2000 the Irish Department of Education and Science defined Lifelong learning rather completely and clearly as the "lifelong, lifewide, voluntary, and self-motivated" pursuit of knowledge for either personal or professional reasons. Lifelong learning, which goes above and beyond traditional schooling, is the appropriate concept of reference in the context of our observed student population (in the case of acquisition of formal notions, leisure skills outside studies, of continuing education (extension courses), of personal learning environments or self-directed learning). Our research question is clearly built around informal voluntary lifelong learning, but with a specific vehicle (the Internet) as will be explained in the next paragraph.

E-learning

Electronic learning or e-learning is a general term used to refer to Internet-based networked computer-enhanced learning: Bowles (2004) defines it as “a learning experience involving the acquisition or transfer of knowledge delivered or transacted through electronic means.”

The term refers to the use of technology in learning in a much broader sense than the computer-based training of the 1980s. It is also broader than the term “online learning” which

generally refers to purely web-based learning. M. Nichols (2008) insists on the fact that the Web is the sole medium used in online learning. Online learning is included in distance learning but is more limited in scope (we observe only online practices and not offline). As a result of all these definitions, in this work, we study informal voluntary lifelong learning via the "online" vector.

Literature review links between Internet and learning

Considering the importance of IT based learning and the debate surrounding the idea that with IT comes a new way of learning, an abundant literature has studied e-learning systems implementation and the keys factors of success.

Factors of success for the diffusion of e-learning systems

Viewed as IT solutions, e-learning systems are seen as IT tools, (Selim, 2003; Martins and Kellermanns, 2004; Ong and Lai, 2004; Pituch and Lee, 2006; Imamoglu, 2007; Chen and al., 2008).

We know, thanks to Davis' seminal work on the acceptance of IT tools, and due to the TAM (Technology Acceptance Model) theory (Davis 1989, Davis and al., 1989), that the key factor for success in the adoption of a technology is the user's will to use it. Additionally, this willingness depends on his perception of the usefulness of the tool and its ease of access.

Of course, ergonomic factors play as important a role as its availability for facilitating the access of an IT system. But in regards to factors for dealing with e-learning technologies in general, computer skills remain important (Soong et al., 2001; Lim et al., 2007).

Maintaining our focus on the student, it is his motivation (Piccoli and al., 2001; Salas and al., 2002; Meissonier and al., 2006; Lim and al., 2007; Selim, 2007), but also his capacity to adapt himself to a new way of learning, that are key factors (Volery and Lord, 2000).

Considering these points, we have chosen to distance ourselves from the typical point of view which looks at the adoption of a specific instantiation of an e-learning service in a specific place, in order to go deeper into the study of the user factor: what does the user look for when adopting an e-learning system, and what sort of knowledge is e-learned today, are there different ways to e-learn today (forum, Web...) and do computer skills still matter even when you belong to the "Y generation".

Computer literacy

There is no stable definition of computer literacy, and thus of its measurement (Alshare, Grandon, Miller 2004). Ezzaine (2007) distinguishes between the skills, or the capacity of doing things, the concepts (roughly speaking the knowledge of how computers work), and the capabilities, which are the capacities to acquire new skills. Hargittai (2005), by means of a survey, may have proposed the most complete analysis regarding the measure of digital skills. In this article, however,we want to understand the link between IT literacy and the use of IT to acquire new knowledge. Thus, we will track the skills (what people do with a computer) and their capabilities which we define as people's ability and their self confidence in the use of IT.

Research question

In this work, we want to understand the link between IT literacy and the use of IT to acquire new knowledge (all kinds of declarative or procedural knowledge). We focus on how students learn things voluntarily (i.e. of their own free will) for their studies or in addition to the same. Our hypotheses are that informal learning can also be transmitted by the Internet, and that its use helps improve e-learning faculties for their studies and outside their studies: there may be a cumulative "learning effect" of using the Internet to learn. So we will track the skills (what

people do with a computer) and the capabilities, as defined as their ability and their self confidence in the use of IT.

In light of the above, in this work, we focus on online voluntary informal lifelong learning, freely chosen by the learner and concerning any field of learning (academic, non-academic hands on knowledge or non-academic theoretical knowledge). The adopted viewpoint is systematically that of the learner who judges the effectiveness and quality of that which has been learned.

Methodology

In order to better understand the impact of Internet use on online learning, we chose to use a quantitative methodology. A questionnaire, briefly described in the next section, was developed and a process was defined for its administration.

For this study, we use a sample of 139 students enrolled in two French undergraduate institutions (one in the geographical area referred to as “Ile de France” including Paris and its surrounding suburbs, and one in “Province”, the zone made up of all the rest of France). The students completed the online questionnaire in the first half of June, 2009. The questionnaire was only available online and we contacted the whole student population of these two institutions via mailing lists. The two reminders were also sent electronically.

For building these analyses, we used SAS and Spad statistics softwares.

Questionnaire description

The questionnaire was designed in three parts. On the Web it is available only in French.

The questions in Part 1 target areas of academic study and how the students use the Internet and online support provided by their universities to learn or complete their knowledge (declarative knowledge).

The second part deals with the use of the Internet to acquire or to develop knowledge in addition to their studies (academic, non-academic hands on knowledge or non-academic theoretical knowledge: declarative and procedural knowledge). We collected information on behaviors for four types of knowledge: theoretical knowledge (foreign language, music), methods (recipes..., including a part related to important tacit knowledge), and guides (a completely explicit part) that is split into two sections: instruction manuals (e.g. a guide for installing new electronic equipment) or tricks and tips (for example, new way of using your mobile phone).

For each knowledge/learning target group, in addition to the frequency of use, we asked for the places (forums, Web pages...) where the information was sought. Other questions related to learning and the perceived advantages of the Internet in general, and in comparison with traditional written "media" and conversations.

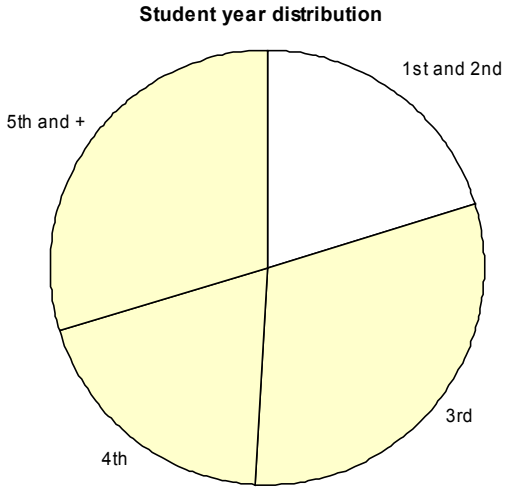
The questionnaire terminated with socio-economic questions about the surveyed individuals, about their computer and Internet levels, and their conditions for access to a computer and to an Internet connection.

Answers to the majority of questions about learning and Internet use were solicited using a five-point Likert scale. The last questions are about the perceived capability of the person in regard to the Internet, to what extent they judge themselves competent to manage on the Internet today and in light of the recent evolution of services (Facebook for example). This idea is also compatible with Bandura's (1977, 1982) concept of perceived self-efficacy. This represents either an individual's confidence about his or her capacity to achieve the actions required to obtain a given result (Bandura, 1977) or one's auto-judgment concerning how well

one can execute courses of action required in order to deal with future situations (Bandura, 1982).

Brief description of the sample

The sample (139 students) is made up of as many men as women. On average, students are 22.2 years old, with a standard-deviation of 2.6 years. As can be seen in the next graph, 20 % of the students are in the first or second year of their undergraduate studies and 30 % in are in their fifth or more year. Thirty-eight percent of the students are enrolled in economics, management, business or administration and 56 % are studying engineering, technology or computer science.

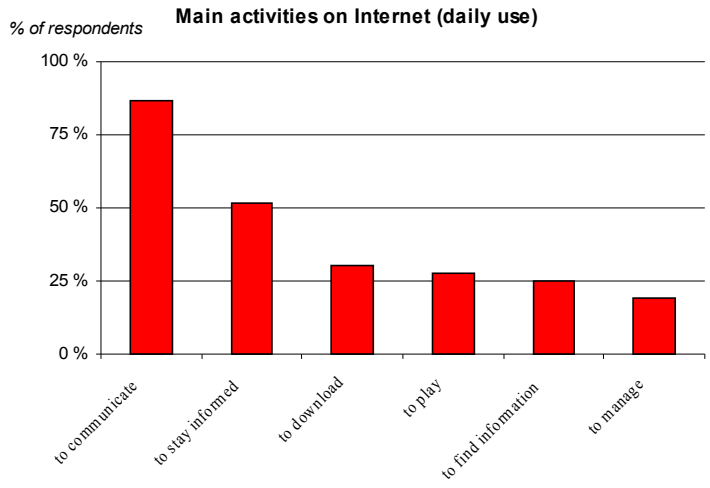


Graph 1

Thirty-three percent of the students live in student housing, 31 % with their parents, 19 % live alone in independent housing and 16 % co-rent an apartment. In the financial context, 38 % of respondent students judge that they get by with their current revenue and 35 % think that they have a comfortable life with their current income. Thirty-five percent of them are working while studying.

Eighty-two percent of the students esteem that they came from an urban background (and thus 18 % from a rural one). Forty-nine percent of the parents of the students sampled live in the Ile de France, 34 % in Province and 19 % in a foreign country. Fifty-seven percent of fathers and 34 % of mothers belong to "superior intellectual professions". Thirteen percent of fathers and 6 % of mothers are "self employed heads" of a company (including farmer, craftsmen, and tradesmen). These two professional categories are overrepresented in our sample relative to the general French population where 11 % of men and 6 % of women have superior intellectual professions and 7 % of men and 2 % of women are self employed head of a company (source INSEE 2007). This phenomenon corresponds to the sociological differences among parents whose children pursue undergraduate studies.

Let us now investigate the Internet and computer aspects. In the sample, all students have a personal computer at home; 88 % are the sole user, and the others share. Ninety-seven percent have Internet access at home. Ninety-two percent use Internet more than an hour per day on average. As can be seen in the next graph, they use Internet daily or almost daily to (in descending order of importance) communicate (mail, chat), to stay abreast of information (online journals...), to download music, films…, to play or to relax, to find information (travel preparation, price comparisons…) and to manage personal affairs (online banking operations, taxes …). At least once a week (on average), 17 % of the respondents buy online, 15 % post their opinion on a forum, 8 % write a blog and 6 % sell online.



Graph 2

More than 90 % of the students use Internet daily in the place where they live (during the week or during the week end; daily means number of days with use / number of possible days near 1), 61 % of them use it daily in the place where they study and 11 % of them access the Internet daily from "elsewhere" (friends, coffee shop,..). In each place, the students have similar behaviors relative to the Internet: the relative weight of each type of Internet use is quite similar from one place to another. They communicate relatively more where they live. They play and relax where they study relatively more frequently than in other places. To a lesser extent, they also play and relax (relatively more frequently than in other places) where they live during the weekend, but relatively rarely elsewhere as compared to where they live and above all, as compared to where they study. They stay informed mostly where they study or live during the week; they attend to this activity relatively less elsewhere (friends, coffee shop). They buy online, sell online, write blogs, or, to a lesser extent, manage personal affairs "elsewhere" relatively more frequently than where they study or live.

Finally and globally, the students of the sample feel themselves at ease and capable of managing with the Internet: 75 % of them esteem that they are very capable and 21 % think they are capable. As concerns new services (Facebook, etc.), 70 % of the students think they

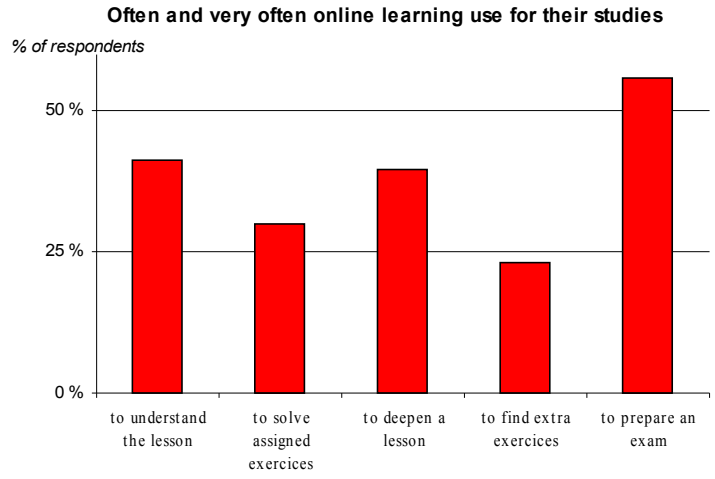
are very competent to evaluate eventual benefits of these services and to use them, and 23 % judge themselves as competent.

Influence of Internet use on online learning

Let us now examine the main object of our work, the influence of Internet on online learning. In an initial approach, we will observe it by using descriptive statistics to refine it. Because we show that there is a relation between satisfaction with online learning and Internet use, we deepen our analysis with data analysis techniques in order to obtain emerged structuring factors of this phenomenon and finally to build a typology of typical behaviors.

Initial approach

For their studies, the students in our sample learn online quite often. As can be seen in the next graph, overall they prepare their exams in this manner, deepen a lesson or attempt to understand the lesson given in class. Respectively 29 %, 19 % and 13 % of the students systematically practice these types of online learning. The use of online learning is significantly less frequent when it comes to exercises (solving given exercises or finding new ones).

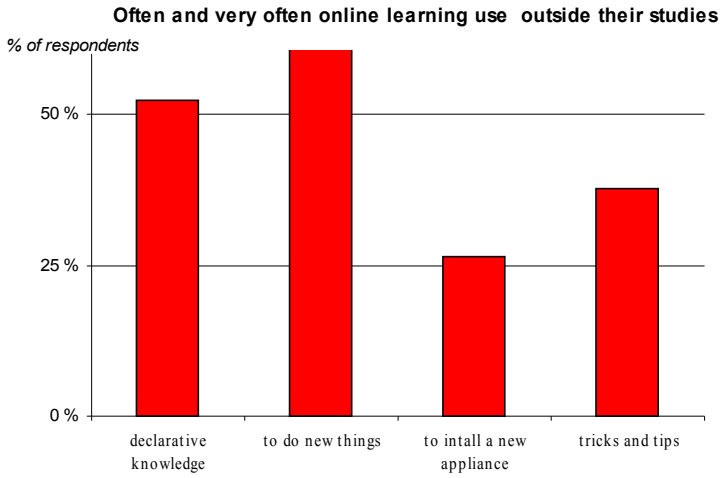


Graph 3

Thirty-seven percent of the students use online learning as their primary resource, prior to any other vehicle (courses, friends, library) to deepen a lesson, 28 % do the same in order to prepare an exam, 23 % to understand the course given in class, 19 % if they want more exercises and 12 % to solve exercises they have to do for their course work.

Fourteen percent of students are very satisfied with voluntary online learning for their studies (72 % are satisfied). This figure is in relation with the 12 % of students who agree totally that they find via this activity what they wanted (67 % agree). Forty percent of the students agree with the facts that they easily find and that they rapidly find what they want, but 22 % disagree with the first proposition and 24 % with the second.

Outside their studies, as can be seen in the next graph, the respondents of our survey the most frequently (often and very often) learn online to do new things and learn theoretical knowledge. Thirty-six percent of the students learn via Internet, even very often, new things to do (preparing a recipe for example) and 26 % learn new theoretical knowledge in this way, 18 % learn tricks and tips and 12 % learn via internet very often to install new appliances.



Graph 4

Outside of their studies, in order to learn new things to do, 66 % of the students use Internet in preference to other methods; 39 % do the same in order to learn tricks and tips, 38 % in order to learn new theoretical knowledge and 27 % for installing a new appliance.

Global satisfaction with online learning is quite general. Thirty-three percent of the students are very globally satisfied with their online learning of new things to do (31 % very often find what they look for in this field). This figure hovers at 27 % for learning to install a new appliance (respectively 25 % find what they want), 26 % for learning theoretical knowledge outside of their studies (21 %) and 23 % for learning tricks and tips (20 %).

When considering global satisfaction with online learning and perceived personal capacity for using the Internet, we notice that, regardless the type of learning, the higher the perceived capacity, the higher the satisfaction about learning. Thus, 37 % of the students who judge that they manage very well with the Internet are very satisfied with their online learning of new things to do (versus 32 % in the whole sample), it is the same relation for learning tricks and tips (29 % for those who manage very well with the Internet versus 21 % over the whole sample), for learning theoretical knowledge outside of their studies (30 % versus 26 %), for learning to install a new appliance (30 % versus 27 %) and, less clear, for learning declarative knowledge for their studies (14 % versus 13 %).

The structuring factors

In order to deepen our understanding of online learning and Internet use behaviors, we used data analysis techniques. This allowed us to take into account the multi-dimensional character of this phenomenon. We were thus able to simultaneously analyze several variables to obtain a more global vision without a priori in order to understand the relation between online

learning and Internet use by identifying the most important variables structuring the corresponding behaviors.

For Multiple Correspondence Analysis, which technically should be applied when using qualitative variables, the individuals with all their features and their characteristics about their Internet use and their online learning, were projected on a subspace with the least possible deformation, considering the initial point cloud of individuals. The axes of this subspace structure the primary data. The axes are sorted by order of importance and, as linear combinations of the original variables, can thus be interpreted. The hierarchical and ascending classification analysis allows grouping of individuals with similar behaviors related to learning and Internet use into clusters (i.e. categories) always taking into account the multidimensional features of these opinions and without a priori. These clusters can then be characterized by the initial variables.

We successively applied these two techniques to our data. First, we describe below the results of the multiple correspondence analysis (the structuring factors), and then we present the typology created by the hierarchical and ascending classification.

We built the correspondence analysis on 36 active variables (which fit with almost 200 modalities): we took into account eight variables characterizing autonomous and voluntary online learning for their studies (in which situation did they use the Internet to learn –as a first or a last resort-, means used (search engine, forums, etc…), reason for and degree of satisfaction, Value of the Internet for this task relative to written documents or conversations with people), four variables for learning in addition to their studies (frequency and situation for hands-on knowledge and tricks and tips), 18 variables on the satisfaction and advantages of hands on knowledge learning and six variables on Internet use (frequencies, place and type of use, self-judgment of their own capacities). These variables were chosen because they allow us to obtain better quality structuring axes and typology. They also allow us, as

previously said, to define an interpretable subspace. The remaining variables (as compared with the active variables) were also projected on this subspace and allow us to complete its interpretation. We worked with the responses of 125 active individuals (we dropped those with excessive numbers of un-completed questions concerning Internet use).

We chose to retain four main axes[1] to understand the online learning behaviors and Internet use observed in our sample.

The most important determinant of behaviors regarding online learning and Internet use is the perceived need to learn hands on knowledge (procedural knowledge). Next comes the degree of satisfaction for online learning outside studies, followed by a wide range of online learning practice behaviors. Finally, the fourth axis is built around the Internet learning practice dexterity. These four factors are detailed below.

The most structuring axis places in opposition two extreme positions about the **need of hands on knowledge learning** (procedural knowledge). On one side we find students who have no need for learning hands on knowledge. They have never tried to acquire hands on knowledge, regardless of the medium, either via the Internet or by a more traditional vector. Moreover they do not have access to the Internet where they live during the week and, in a similar vein, they never access the Internet from where they live during the weekend. At the other end of the spectrum, we find students who use Internet as a primary resource when they want to learn how to do new things (hands on knowledge). They judge this medium as more rapid than a written document, easier of access, more readily available and less expensive. They also think it is more available and quicker than asking someone. Broadly speaking, it pertains mainly to practical advantages for organizing one's life. These students have an Internet connexion where they live during the week and access it every day from this location.

[1] These four axes correspond to 30 % of the initial inertia (see the Annex), but (be careful!), it is a multiple correspondence analysis and not a Principal Component Analysis (PCA), this percentage can not be interpreted in the same way.

The second factor is deepening learning outside studies and is concentrated on the perceived **degree of satisfaction in relation to all kinds of online learning, but outside formal studies** (declarative and procedural knowledge: learning new theoretical knowledge, new things to do, how to install new appliances, tricks and tips). Among users of this type of learning, it opposes students who are very satisfied with it and students with more mixed opinions (albeit positive or neutral ones). The first ones esteem, that Internet provides all advantages proposed in the questionnaire (for the access: easiness, rapidity, availability; for the content: richness, timeliness) in relation to more traditional media (written document or individual) particularly for learning new things to do, but for learning other elements of hands on knowledge too, and, to a lesser extent, for learning theoretical knowledge outside of their studies. They are globally very satisfied with their online hands on knowledge learning and easily find, every time or virtually, what they are looking for. The other ones are more moderate in their appreciation. They hesitate to praise the advantages of online learning, or they do no more than admit that online learning has practical advantages in relation to a written document or a person (quicker, more available, easier, less expensive). They said they are globally satisfied with their online learning but they neither confirm nor deny whether or not they find, on average, what are they looking for.

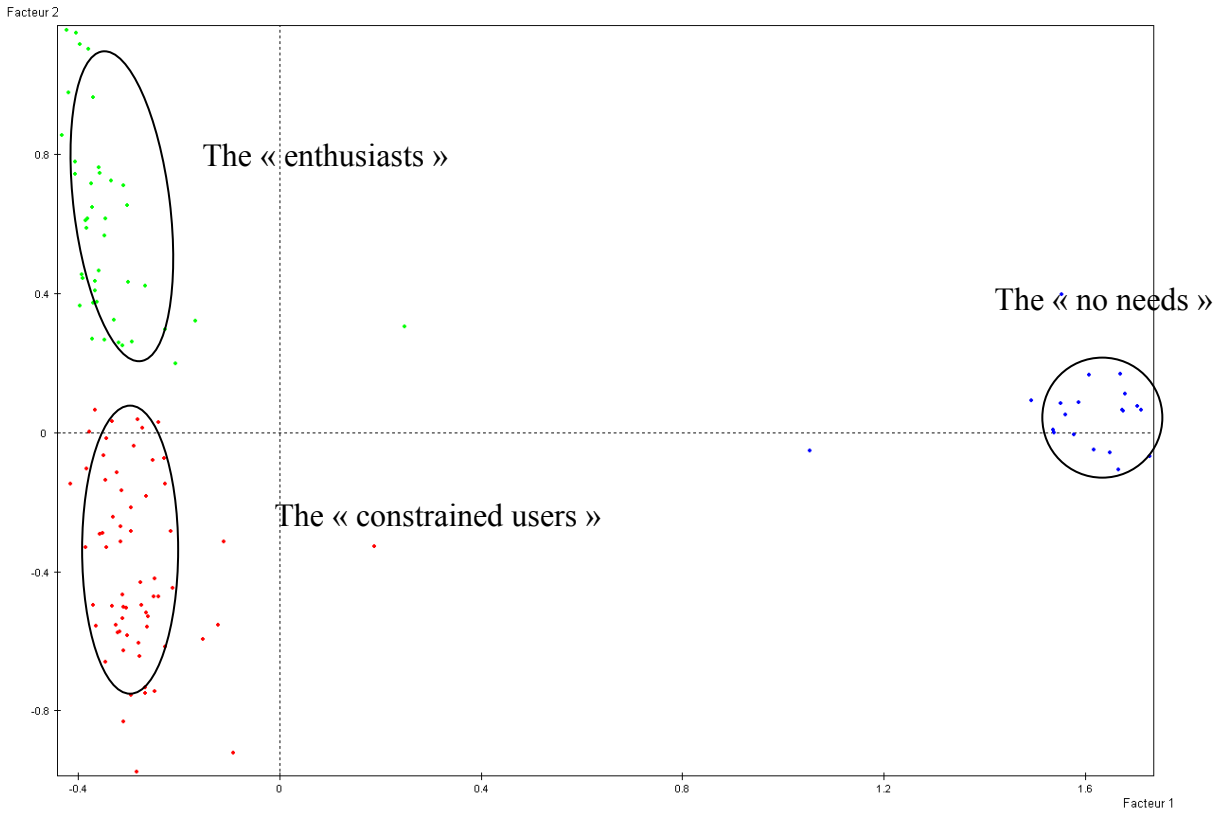
The third axis presents a wide range of **online learning practice behaviors**. At the two extremes, we find, on the one hand, students who use online learning for their studies above all (and voluntarily). They use Internet as a last resort without being convinced, and they do not confirm whether or not they have found what they were looking for : they do not take a position as to whether they think Internet is a better medium for learning, even when very pointed questions are asked (access rapidity, for example). They are still less convinced when they want to learn hands on knowledge in parallel with their studies: they indicate that in this field, in general, they do not find what they look for when they try to learn online. On the

other hand, students pursue online learning above all outside of their studies, specifically theoretical knowledge or all kinds of hands on knowledge. In regard to all these kinds of online learning they are satisfied quite globally, they find quite easily and quickly what they look for when seeking online learning. They esteem that online learning presents a lot of advantages compared to more traditional media of learning, and particularly when compared to learning with a person (more up to date and richer contents, quicker, easier, and more available access).

The fourth factor is a factor of dissatisfaction toward online learning. On the one hand, they are students who do not feel that the proposed items (quicker, easier …) are advantages or disadvantages for online learning. They do not manage to determine if Internet is preferable to a person or not, they are not sure to find what they look for and they question themselves about their global satisfaction: this applies when they voluntarily try to learn new theoretical knowledge within the framework of their studies or when they try to learn hands on knowledge (new things to do). On the other hand, we find students who disagree with all the proposed items valued as advantages of Internet learning. For them, a written document, or perhaps a person, is more efficient particularly to learn hands on knowledge (clearer, richer, more available, and more up to date). They have difficulty finding what they look for and it takes them a relatively long time. They are globally unsatisfied with their online learning. This axis seems to be related to **Internet learning practice dexterity**: on the one hand, students who prefer not to say if they are satisfied or not with online learning and do not know if they find what they look for; on the other hand students who are not satisfied with it because they experience difficulties finding what they want.

A typology of online learning

We then performed a cluster analysis on the sample using the axes obtained by the multiple correspondences analysis (all the axes). We chose to read the database in three categories which are detailed below. The dendogram is given in the Annex. As can be seen in the next graph, our data is split into three categories, one having no need of hands on knowledge learning (16 % of the data), one (51 %) which is composed of almost constrained users and the last one corresponds to enthusiasts for online learning (33 %)



Graph 5: Classification - principal plan (first and second eigenvectors)

The “no needs”

16 % of the data

Students in this cluster say that they never use Internet to learn to do new things like cooking a new recipe for example because they never tried to learn this kind of competence (procedural knowledge). It appears that they do not hold especially negative opinions about the Internet thus they do not feel the general need of learning this procedural knowledge (perhaps because they judge they know enough in relation with their specific need). As a result of this opinion, in the preceding year, in addition to their studies, they never used Internet to learn hands on knowledge for making new things or installing a new appliance. For this last potential action, they indicate that it was “not applicable” (that is to say they had no new appliance or there was no specific installation for them). Alternatively, for their studies, in the preceding year they never accessed the Internet in order to understand lessons given in class. Men are overrepresented in this cluster (80 % of the individuals of this cluster are men versus 50 % in the whole sample) and, more often than on average, they never access Internet from where they live during the week (80 % of the people in this situation are in this cluster).

The “constrained users”

51 % of the data

In this cluster, students use all kinds of online learning (declarative and procedural knowledge) via Internet, above all in the procurement of hands on knowledge in addition to their studies and judge that they are merely satisfied or hesitate to judge it. But it seems that they are constrained users or users who are following “the crowd”. They use Internet as they do any other tool, to improve their knowledge and consider that it is, at best (otherwise they do not specifically judge its advantages), a bit better than written documents for ease and rapidity of access, for availability and lower cost, for clarity and the up to date nature of the

content. In relation to a conversation with an individual, they think mainly that learning via the Internet is perhaps more available (Sunday, late at night…), with easier and quicker access and with more up to date information. They are globally satisfied with their online learning of hands on knowledge and they, grosso modo and in general, find what they look for. Thus, they most appreciate the practical advantages offered (easy, quick and available) by this activity. They are not active users, they never ask questions on forums or of discussion groups, (or FAQ) when they try to learn via Internet hands of knowledge, although they frequently use these resources for this activity, but as passive readers.

The "enthusiasts"

33 % of the data

What particularly distinguishes this cluster is the good opinion students have about their online learning, for all kinds of learning and more particularly for hands on knowledge learning (procedural knowledge). For this type of learning, in order to make new things, they judge Internet in relation to traditional media (written documents or conversations with people) as easier and quicker of access, and is more available. They esteem the content richer and more up to date. They are globally very satisfied by this kind of learning and its results and they very often find what they look for. For all other kinds of learning they pursue in addition to their studies (declarative knowledge and other procedural kinds, like hands on knowledge to install an appliance or to discover some tricks and tips) it is more in relation to a person that they judge the Internet medium as better, above all in terms of content and quality of the transmitted knowledge (learning via Internet provides richer, clearer and more up to date information). For their studies, they voluntarily use online learning as a first resort, before all other media (books, friends …) to understand or deepen a lesson given in class. Finally, more frequently than on average, they have a very high perceived capacity (self-

efficacy) of their own abilities to manage Internet and its new services (Facebook for example).

Discussion and conclusion

In conclusion we show in our results that the effect of Internet use on online informal learning, while not being of the first order, is nonetheless present and effective. The four main structuring factors (perceived need to learn hands-on knowledge; degree of satisfaction with online learning outside studies; type of online learning practices; Internet learning practice dexterity) of the behaviors outlined in this paper are not Internet use centered, but the elements that characterize Internet use appear very clearly in the classification results. Two of the three clusters we built are characterized by Internet use. "The enthusiasts" have a high level of self-efficacy with the Internet and are "big" Internet users in terms of frequency of use. At the other end of the spectrum, the "no needs" have very restrained Internet use, they only use when it is necessary for them to do so. We can also interpret this phenomenon as a "cumulative" or "multiplier" effect of Internet use on online learning.

It bears noticing, as well, that socio-demographic variables do not play a role in online learning: these kinds of variables which, a priori, should impact learning behaviors do not appear in the analyses. This means that regardless of gender, age, field of study, familial background (parent's professions), or revenues, student online informal lifelong learning behaviors are globally similar.

Moreover, in the debate concerning the digital native generation (see introduction), we must say that our results confirm that, for a part of the student population, the Internet is now a commodity everybody is able to use. However, we have focused on undergraduate students from the upper middle class as that is the population present at the two universities from

which our sample was drawn. Thus, the impact of Internet skills on the use of e-learning should remain on the research agenda as other studies have shown that that 25% of the students of today do not use the Internet for University purpose (Dang Nguyen et al. 2009).

But even for this IT literate population, there are differences in the uses and the perception of online learning. In line with what we know about adopting a new technology, perceived need and efficient past experiences remain the principle factor of adoption. IT is a tool whether it is used for educational purposes or not, and the more you need the tool, the easier its appropriation is.

We may, however, formulate another hypothesis regarding the Internet. Currently, availability is the strongpoint in knowledge provision via the Internet (speed, 24/7, etc.) This is particularly valuable for hands on knowledge, which most of the time is sought for immediate use (I need a recipe for this evening's party, how do I unlock my mobile phone, etc.) Competitive advantages are less noted regarding theoretical knowledge, where structured cumulativeness is the key word. This may be due to student integration of teacher reluctance to use this new media as Kolikant (2009) argued. It may also be a sign that there is room for new ways of looking at IT educational tools. These new ways should be focused more on the "place" where they provide a perceived added value, i.e. in provision, collection and selection, and communication of information, and to a lesser extent on complex global knowledge transmission systems, where users are less convinced of their value, at least for the time being.

References

Anderson , J. R. (1976), Language, memory, and thought. Hillsdale, NJ: Erlbaum

Bandura A. (1977), Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review*, 84 (2): 191-215.

Bandura A. (2002), Social Cognitive Theory in Cultural Context. *Applied Psychology*, 51 (2): 269–290

Ben Youssef A., Rallet A, eds (2009) *Usages des T.I.C. dans l'enseignement supérieur*, Réseaux, vol. 27 - n°155

Bowles, M. S. (2004), Re-learning to e-learn: Strategies for electronic learning and knowledge, Melbourne, Melbourne University Press.

Brown, J. S. (2002), Growing Up Digital. How the Web Changes Work, Education, and the Ways People Learn, *United States Distance Learning Association Journal*, vol. 16/2, available at http://www.usdla.org/html/journal/FEB02_Issue/article01.html.

Chapman A. (2006), Interpretation or explanation of Bloom's Taxonomy of Learning Domains, http://www.businessballs.com/bloomstaxonomyoflearningdomains.htm (accessed 30th June 2009)

Chau, P. Y. K. (2001), Influence of computer attitude and self-efficacy on IT usage behavior, *Journal of End User Computing*, Vol. 13, N° 1, pp. 26–33.

Chen, I. J., Yangb, K. F., Tanga, F., Huanga, C. and Shu, Y. (2008), Applying the technology acceptance model to explore public health nurses' intentions towards web-based learning: A cross-sectional questionnaire survey, *International Journal of Nursing Studies*, vol. 45, no6, pp. 869-878

Compeau D., Higgins C.A., (1995), Computer self-efficacy: development of a measure and initial test, *MIS Quarterly*, Vol. 19, N° 2, pp. 189-211.

Dang Nguyen, G, Trémenbert J. Le Squin S. (2009). Les étudiants bretons et l'Internet : Mythes et réalité, M@rsouin studies. Consulted http://www.marsouin.org/IMG/pdf_/article_etudiant_Panorama.pdf (accessed 30th June 2009)

Davis, F.D. (1989), Perceived Usefulness, Perceived Ease of Use, And User Acceptance of information technology, *MIS Quarterly*, Vol. 13, N°3, pp. 319-340.

Davis, F., Bagozzi, R. P., Warshaw, P. R. (1989), User Acceptance of Computer Technology: A Comparison of Two Theoretical Models, *Management Science*, Vol. 35, N° 8, pp. 982-1003.

Department of Education and Science (2000), Learning for Life: White Paper on Adult Education. Dublin: Stationery Office. http://eric.ed.gov/ERICDocs/data/ericdocs2sql/content_storage_01/0000019b/80/1a/c6/5e.pdf (accessed 30th June 2009)

Ezziane, Z. (2007), Information Technology Literacy: Implictions on Teaching and Learning, *Educational Technology & society*, 10(3), 175-191.

Hargittai E. (2005), Survey Measures of Web-Oriented Digital Literacy. *Social Science Computer Review*, 23(3), Fall 2005, 371-379

Imamoglu S. Z. (2007), An Empirical Analysis Concerning the User Acceptance of E-learning, *Journal of American Academy of Business*, Vol. 11, N°1, pp. 132-137.

Kolikant Y. B.-D. (2009), Digital Students in a Book-Oriented School: Students' Perceptions of School and the Usability of Digital Technology in Schools. *Education Technology & Society*, 12 (2), 131-143.

Lim H, Lee S.G., Nam, K. (2007), Validating E-learning factors affecting training effectiveness , *International Journal of Information Management*, Vol. 27, pp. 22–35.

Martins L. L., Kellermanns F. W. (2004), A Model of business school students' acceptance of a web-Based course management system, *Academy of Management Learning and Education*, Vol. 3, N° 1, pp.7–26.

Meissonier R., Houze E., Benbya H, Belbaly N. (2006), Performance Factors of a Full Distance Learning: The Case of Undergraduate Students in Academic Exchange, *Communications of the Association for Information Systems*, Vol. 18, N°12, pp. 1-33.

Nichols M. (2008), E-learning in context. http://akoaotearoa.ac.nz/sites/default/files/ng/ group-661/n877-1---e-learning-in-context.pdf (accessed 30th June 2009)

OECD (2007), Lifelong Learning and Human Capital, Policy Brief, July, http://www.oecd.org/dataoecd/43/50/38982210.pdf (accessed 30th June 2009)

Ong C., Lai J., Wang, Y. (2004) Factors affecting engineers' acceptance of asynchronous e-learning systems in high-tech companies, *Information & Management*, Vol. 41, pp.795–804.

Piccoli G., Ahmad R., Ives B. (2001), Web-based virtual learning environment: A research framework and preliminary assessment of effectiveness in basic IT skills training, *MIS Quarterly*, Vol. 25, N° 4, pp. 401-426.

Pituch K.A., Lee Y. L. (2006), The influence of system characteristics on e-learning use, *Computers & Education*, Vol. 47, pp.222–244.

Salas E., Kosarzycki M.P., Burke C.S., Fiore S.M, Stone, D.L. (2002), Emerging themes in distance learning research and practice: some food for thought, *International Journal of Management Reviews*, Vol. 4, N° 2, pp. 135–153.

Selim H. M. (2003), An empirical investigation of student acceptance of course websites, *Computers & Education*, Vol. 40, pp. 343–360.

Selim H. M. (2007), Critical success factors for e-learning acceptance: Confirmatory factor models, *Computers & Education*, Volume 49, Issue 2, September 2007, Pages 396-413

Soong M. H. B., Chan H. C., Chua B. C., Loh K. F. (2001), Critical success factors for online course resources, *Computers & Education*, Vol. 36, pp.101-120.

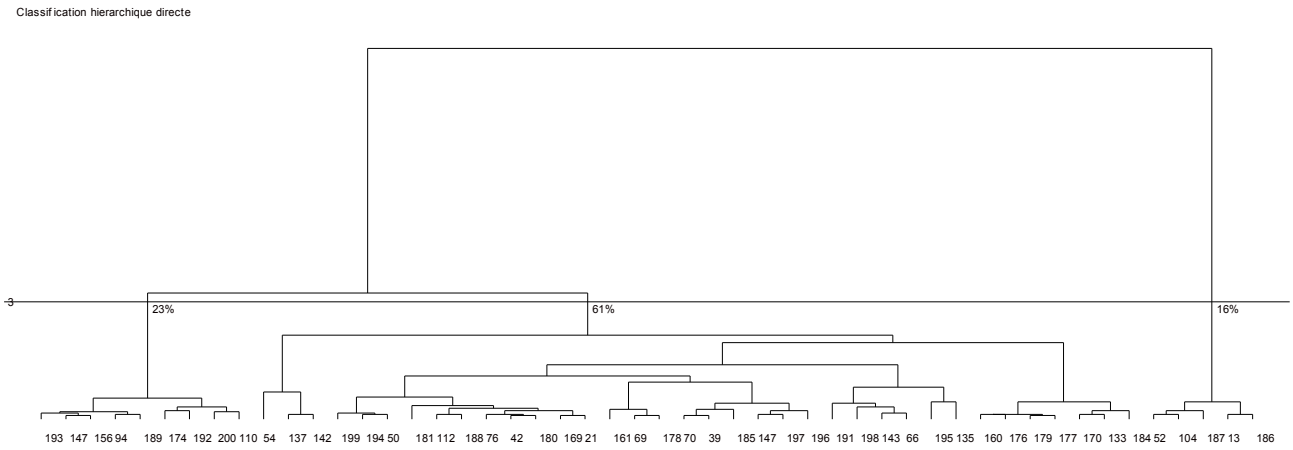
Volery T., Lord D. (2000), Critical success factors in online education, *The International Journal of Educational Management*, Vol.14, N° 5, pp. 216-233.

Annex – Correspondence analysis results

HISTOGRAMME DES124 PREMIERES VALEURS PROPRES

NUMERO	VALEUR PROPRE	POURCENT.	POURCENT. CUMULE	
1	0.4939	13.57	13.57	**********
2	0.2466	6.78	20.35	*****
3	0.1762	4.84	25.19	****
4	0.1570	4.31	29.51	****
5	0.1179	3.24	32.75	***
6	0.1046	2.88	35.62	***
7	0.0907	2.49	38.11	***
8	0.0896	2.46	40.58	***
9	0.0809	2.22	42.80	***
10	0.0770	2.12	44.92	***
11	0.0725	1.99	46.91	***
12	0.0691	1.90	48.81	***
13	0.0677	1.86	50.67	***
14	0.0653	1.80	52.47	***
15	0.0635	1.75	54.21	***
16	0.0614	1.69	55.90	***
17	0.0600	1.65	57.55	***
18	0.0595	1.64	59.18	***
19	0.0562	1.54	60.73	***
20	0.0534	1.47	62.20	***

ACM : first eigenvalues histogram (line chart)



Classification : dendogramm (choice of three clusters)