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Model of Information and Communication Technology (ICT) Acceptance and Use for Teaching Staff in Sub-Saharan Africa Public Higher Education Institutions

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The preliminary results of this paper have been presented in the form of a poster to the Congress of the Francophone Association for Knowledge (Acfas), Québec 2008, under the title "Un modèle prévisionnel de l'utilisation éducationnelle des TIC: une évidence empirique des enseignants de l'université de Ouagadougou (UO)".

Abstract

This article uses data survey on 82 teachers from the University of Ouagadougou and the model of unified theory of acceptance and use of technology (UTAUT) to assess the determinants of acceptance and educational use of ICT by teachers. The paper's outcomes show that the construct "performance expectancy" of ICT (expected utility and expected results) positively affects the teachers' acceptance of ICT. Acceptance of ICT and the Internet experience positively affect the educational use of ICT. However, facilitating conditions have a negative effect on these purposes. The Internet experience of teachers has a positive and significant direct effect on their specific use of ICT. These results could help public powers' decision makers to develop effective policies for introducing ICTs in Higher Education Institutions.

Keywords: IT, IT educational use, TUAUT Model, University of Ouagadougou, Burkina Faso

1. Introduction

The UNESCO report (2003) on "Recent Developments and Prospects of Higher Education in Sub-Saharan Africa (SSA) in the 21st Century" presents a rather dramatic picture of education in SSA in recent decades: the rate of enrollment growth in higher education in SSA has been among the highest in the world, the system of higher education in SSA is the least developed of all regions of the world which results in a significant deterioration of academic infrastructure and research, a capacity reduction of student supervision, inadequate learning materials and a decline in the quality of teaching and research. Added to this, is the deteriorating conditions of service of teachers. Also, reforms of higher education in SSA has been undertaken to eliminate deficiencies identified to improve the relevance and quality of education and research and to strengthen the institutional capacity by exploiting opportunities offered by the rapid development of information technology and communication (IT) (UNESCO, 2003). Since 1998 , three major strategies have been adopted to improve the quality of higher education through workshops: (i) teacher training, (ii) design and development of learning materials for distance education, and (iii) the creation or strengthening of national and sub-regional organizations responsible for accreditation, quality assurance and recognition of studies and qualifications.

Perceived as an important means to improve the quality of teaching-learning and increase the supply of education in developing countries, ITs are subject to national, regional and international policies in favor of Sub-Saharan African countries. For Romer (1990), technological capital is at the root of technical progress and it allows productivity gains and the emergence of new products.

The concept is complex and IT thereby requires clarification. Basque (2004) decomposes the notion of ITs in three keywords and seek appropriate definition with respect to usage that are made by professors of universities today. In computing, the term technology is used instead to designate "all the techniques relating to the nature of

the components of the various parts of a computer and its peripherals", while "information is a message that can be compiled, analyzed, synthesized and transmitted as data" (Legendre, 1993, p. 716). Thus, information technology represents all the hardware, software and services used for the collection, processing and transmission of information (Basque, 2004). A communication system is a system capable of transferring information from person to person, from machine to machine or machine-to-person (Basque, 2004). Ultimately, "IT refers to a set of computer-based technologies, microelectronics, telecommunications (including networks), multimedia and broadcasting, which when combined and interconnected used to search, store, process and transmit information in the form of data types (text, audio, still images, video, etc.) and allow interactivity between people and between people and machines" (op. cit., p. 34).

This definition uses the term media, which "means any physical medium used to convey a message". In the domain of education, we can meet at least four interpretations of the concept of media: media, vehicle of a message; media, symbolic system; media, cognitive tool; media mediate between people, objects and ideas (Op. cit., p. 35). According to Lebrun and Berthelot (1994), "the educational media is [...] support the information in the service of a specific educational purpose, for example programmed instruction is a type of education that can be mediated by the computer, videodisc, print, etc. (p. 154)".

Many authors have surveyed the challenges of IT for education, including showing how IT resolve some problems of education (Duckworth, 2001; Harris & Kington, 2002; Karsenti, 2005). Depover, Karsenti and Komis (2009) argue that our era is marked by rapid changes in IT which schools cannot ignore. Given the implicit and explicit goals of education in SSA, IT is a great way for African people to catch up on the gap created over several decades, and from this point of view, investment in technology could allow development and improvement of the education system in Africa (Agbobli, 2002). Thus, sharing, transfer and acquisition of foreign knowledge contribute to the local development of a region. These studies highlight the benefits of IT in several areas including motivation and professional development of teachers, student motivation, increased educational opportunities, availability and distribution of educational resources and support to administration of educational institutions (Schacter, 1999; Passey, 2000; Karsenti et al., 2001; Karsent, 2006). Several studies have confirmed the existence of a positive relationship between IT use and educational results and academic pupils and students (Russell, 1999; Glennan & Melmed, 1996). Similarly, the possibilities offered by IT for the improvement of the quality of teaching-learning and the increase of educational opportunities are now recognized and accepted by all so that the integration of IT in education has become an absolute necessity, especially for SSA countries (Okebukola, 2001; Dieng, 2004). However, the integration of IT requires both technological and pedagogical skills, hence a significant investment to provide access to IT.

Burkina Faso, like many developing countries lags behind on the development ladder which is detrimental to the national scientific IT community. Online access to different software, resources and information and communication sources (libraries, scientific exchange groups, online journals, scientific databases) sources will improve the quality of research and higher education (DELGI, 2004). The document prepared by the Ministry of Secondary and Higher Education and Scientific Research (MESSRS) of Burkina Faso (DELGI, 2004) on the IT Policy Development for the National Center for Scientific and Technological Research (CNRST), for the University of Ouagadougou (UO) and the Polytechnic University of Bobo (UPB) noted that: "[....] UO must face increasing number of students. It is thus faced with a lack of access to IT, non-computerization of some key services such as human resources, financial resources".

Founded in 1974 with 374 students, the UO has experienced rapid development of its number. The number of students increased from 5,425 to 35,000 between 1990 and 2007, an average annual growth rate of 32% (DAOI, 1974-2007). Accordingly, overstaffing associated with increased inadequate reception facilities make it difficult to use traditional teaching methods. In less than two decades, UO's classrooms that welcomed undergraduate students have become so small in a way that they cannot now accommodate graduate students. In some schools (UFR), officials were forced to interconnect the sound of two classrooms to accommodate an undergraduate and graduate class. The quality of education is strongly affected by the increased numbers of students and inadequate reception facilities and teaching methods.

"As a remedy to these problems, the educational use of Computer-Mediated Communication (CMC) is required" (Mvoto Meyong, 2006, p. 50). According to Sauvé, St-Pierreand Wright (2004), the use of IT can at least overcome the problems of heterogeneity of student's academic levels and overstaffing. Moreover, the bault (2009) argues that distance learning, beyond questions of pedagogy and quality is also considered to reduce class sizes. That is why the Burkinabe authorities have undertaken several policies among others: (i) the creation in 1997 of a Department for the Promotion of New Technologies of Information and Communication (DPNTIC) at

UO, (ii) the creation of a Laboratory of Information Technologies and Communication at UO, and (iii) a joint policy CNRST-UO-UPB for the development of IT (Delgi, 2004).

These policies whose goal is to promote the educational use of IT by teachers and students, can only succeed if teachers first accept technology and undertake to use IT in their teaching practices. Therefore, this article is concerned with studying the determinants of acceptance and educational use of IT by teachers. The acceptance of IT by teachers also called behavioral intention is a necessary condition for the success of any project requirement of IT integration (Pinto & Mantel, 1990). The acceptance of technology by users is an "initial decision of the individual to interact with technology" (Venkatesh, Morris, Davis, & Davis, 2003, p. 446). Acceptance is measured by the subjective probability that a person will adopt the behavior in question (Fishbein & Ajzen, 1975). The adoption of technology "comes only after direct experience with technology and after the individual has decided to accept the technology" (Venkatesh et al., 2003, p. 446). Therefore, understanding the factors affecting the acceptance and use of ITs by teachers UO becomes an important tool to make adequate incentives to achieve better implementation of educational technologies. It is in this context that we plan to study the following two objectives:

1) To estimate the degree of influence of the various determinants of ITs acceptance of by professors at the University of Ouagadougou;

2) To estimate the factors influencing the ITs specific educational uses by professors at the University of Ouagadougou.

This study could be justified on two levels: first, it allows to identify and assess the effect of the main factors expected to positively or negatively affect the behavior of teachers in ITs educational uses; and secondly, it enables the production of scientific knowledge that can provide relevant elements for the development of policies and/or projects of ITs integration in higher education in Burkina Faso.

The following sections successively presents TUAUT model (2), the data used (3), the results of TUAUT model estimation (4) and elements of discussion and conclusion of the results (5).

2. Theoretical Basis and Methods

2.1 Unified Theory of Acceptance and Use of Technology (TUAUT)

This study draws its theoretical foundations from the recent synthesis of eight (8) models of acceptance, appeared under the name of Unified Theory of Acceptance and Use of Technology (TUAUT) (Venkatesh et al., 2003). Conceptual and empirical similarities of these models are used to make an integrated model, more effective and efficient to explain the acceptance and use of new technology (Rosen, 2005). The basic concepts of users' acceptance models and their links are outlined in Figure 1 below.

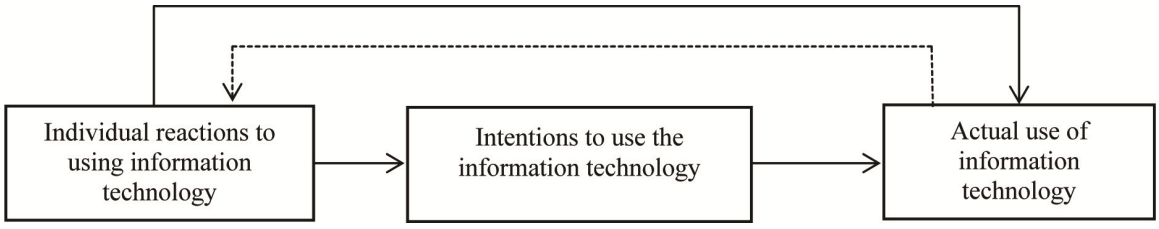

Figure 1. Basic concept underlying users acceptance models (Venkatesh et al., 2003)

It presents the basic conceptual framework underlying class of models, explaining the individual acceptance of information technology that is the basis of this research (Venkatesh et al., 2003). Often are doing researches why people accept or reject new ICTs. There are a lot of conditions that must be met before these technologies can be introduced, adopted and spread to higher education institutions.

The great explanatory power of the TUAUT model and its internal consistency that it is used in several empirical studies in various fields such as education and electronic-services (Jiang, Hsu, Lin, & Klein, 2000; Venkatesh, Morris, & Akerman, 2000; Venkatesh et al., 2003; Lu, Yu, Liu, & Yao, 2003; Anderson & Schwager, 2004; Lin, Chan, & Jin, 2004; Venkatesh, Morris, Sykes, & Akerman, 2004; Carter & Blanger, 2005; Rosen, 2005; Hung, Chang, & Yu, 2006; Alawadhi & Morris, 2008). Figure 1 illustrates how the determinants of TUAUT model affect the acceptance and use of new technology.

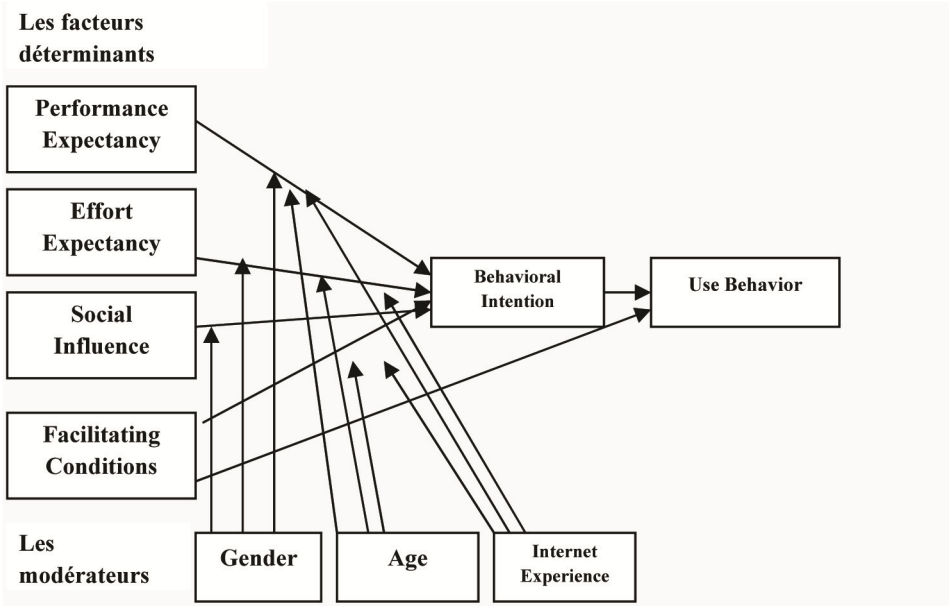

Figure 2. The model TUAUT by Venkatesh, Morris, Davis et Davis (2003, p. 447)

The reactions of teachers and ITs (perceived usefulness, compatibility, expected gain, effort expectancy, etc.) will determine their intention to use IT (acceptance), but also their current educational use of IT (Venkatesh et al., 2003). Model TUAUT contains five direct determinants of behavior of individuals in relation to their acceptance and use of technology:

The performance expectancy is "the degree to which an individual believes that using a system will help achieve gains in job performance" (Venkatesh et al., 2003, p. 447).

The effort expectancy is "the degree of ease associated with the use of the system" (Op. Cit., 2003, p. 450). To Thompson et al. (1991), the degree to which a system is perceived relatively difficult to understand and use.

The social influence is the "degree to which an individual perceives that important others believe he or she uses the new system" (Op. Cit., 2003, p. 451). This is what Ajzen (1991) considers a person's perception that people who are important to her/him think she/he should perform the behavior in question.

The facilitating conditions indicate the "degree to which an individual believes there is organizational and technical infrastructure to support the use of the system" (Op. Cit., 2003, p. 453). It includes objective factors in the institution that observers agree that they ease an act or task to accomplish, including the supply of computer consumables (Thompson et al., 1991; Triandis, 1980).

And behavioral intention of teachers or their acceptance of IT is defined in the introductory part.

Constructs "performance expectancy", "effort expectancy", "social influence" and "facilitating conditions" will determine the acceptance of IT by teachers; moderating factors (age, gender and Internet experience) moderate the effect of these exogenous variables on the acceptance of IT. Acceptance of IT in turn acts on the behavior of IT use.

The large construct—expected performance is captured by four constructs including perceived usefulness of IT, IT expected results, the compatibility of IT in teaching and research tasks of teachers and extrinsic motivation of teachers to use IT. The perceived usefulness of IT, is the degree to which an innovation is perceived as better than the old (Davis, 1989). The expected results are related to the consequences of the behavior of technology adoption for innovative (Compeau, Higgins, & Huff, 1999). Compatibility is the degree to which an innovation is perceived as consistent with the values, needs, and experience of potential members (Moore & Benbasat, 1991). Extrinsic motivation is the perception that users will want to perform an activity because it is perceived to be an instrument in the pursuit of better outcomes that are distinct from the activity itself, such as improved job performance, financial gain, or promotion (Davis et al., 1992).

This article seeks to understand the direct effects of determinants of acceptance and educational use of technology by teachers. It therefore estimates two relationships: the first binds the teacher's acceptance of IT to

determinants model, and the second binds specific educational use of IT (software) to determinants of the model. Estimating such relationships requires the specification of the functional form of links to implement taking into account the nature of the TUAUT model.

2.2 The Functional Specification of the Model

Acceptance models are econometric models with limited dependent variables. Several functional forms exist (Greene, 1993; Maddala, 1985). Logistic functional form is preferred because of the quality of its estimator and ease of use (Maddala, 1992).

We hypothesize that teachers are rational and make choices that maximize their indirect perceived usefulness of the new technology, subject to constraints of spending money and time. This indirect usefulness will depend on the main exogenous variables of the TUAUT model. Teachers are supposed to have preferences between two choices: accept and/or adopt the technology or not to accept it and/or not to adopt it. But before any adoption, teachers must accept it first. That is why we first study the determinants of their acceptance before studying the determinants of their educational uses of technology. The dependent variable Y is defined as follows:

Yij=1 if the technology is approved and/or adopted by the professor i; Yij=0 if the technology is not accepted and/or adopted by the professor i. Observed variables Yij are defined as a group of dummy variables taking the value 1 if the teacher accepts and/or adopt IT in their teaching practices and the value 0 otherwise. The process of choice is formalized as follows (Maddala, 1985, p. 36):

$$y_{ij} = \begin{cases} 1 \text{ if } y^*_{ij} > 0, \text{ if indidivual i accepts and / or adopts technology that means alternative j=1} \\ 0 \text{ if no} \end{cases}$$

Y*ij is an unobserved latent variable that indicates the level associated usefulness with the choice j for teacher i. In other words, the dependent variable Yij is such that: -Yij=1 if teacher i accept and/or adopt the technology in question where y * i1=Max (y*i0,y*i1), that is to say that the utility perceived by individual i of accept and/or adopt the innovation is higher than the one perceived not to accept and/or adopt; -Yij=0 if the teacher i chooses not to accept or adopt the technology, in this case (y*ij<y*i0), $\forall$ j≠1.

Uj is the distribution associated errors, xi is the vector of explanatory variables associated with the choice i perceived by the teacher i and ßj being the vector of estimators including the constant in the equation of alternative j. If uj is distributed independently and identically according to the extreme value of the distribution, the unobserved component utility has a logistic distribution, the errors uj following a logistic law of probability:

$$P = f(\beta_j x_{ij}) = \frac{e^{\beta'_j x_i}}{1+e^{\beta'_j x_i}} \Rightarrow P = \frac{1}{1+e^{-(\beta'_j x_i)}}$$

The linear functional form of this model will be as follows:

$$y^*_{ij} = \beta_j x_i + u_j$$

The probability for the teacher i to accept and/or adopt new technology in their teaching practices (j=1) is:

$$\Pr ob(Y_{ij} = j) = \frac{e^{\beta'_j x_i}}{1 + \sum_{k=0}^{1} e^{\beta'_k x_i}}, \quad j \neq 0 \quad \Pr ob(Y_{ij} = 0) = \frac{1}{1 + \sum_{k=0}^{1} e^{\beta'_k x_i}}, \quad k = \{0,1\}, j \neq 1$$

2.3 Procedures and Estimation Methods

The estimation process of TUAUT model occurs in two steps. The first step is to estimate the acceptance for each observation. The second step is to estimate the equation of each of the six specific educational uses of IT by teachers in integrating not only the variable of acceptance estimated in the first step as an explanatory variable in addition to the other explanatory variables in the model.

The iterative Maximum Likelihood Method was used to estimate the acceptance and the various specific educational uses of IT. Two tests are used to determine the quality of the functional specification of the model and its overall adequacy: the Khi-square test and the pseudo R2 Mc Fadden (Maddala, 1992). The software used were MS Excel, SPSS and LIMDEP.

The estimated model provides three types of indicators (Greene, 1993).

1) The probability Pj to accept and/or adopt the IT application (software) j given that the average level of the variables xi, these probabilities are indicators that may justify the implementation of IT's integration projects in the institution as revealing the level of acceptance and usage of IT by teachers.

2) The βi coefficients of explanatory variables xi. Those do not intervene in interpretations but are used to calculate the marginal effects (ij).

3) The marginal effects (ij) of variables xi that will help understand the impact of these exogenous variables on the acceptance and/or IT adoption, that is to say, to identify and assess the brakes and motivations of teachers in relation to their IT acceptance and adoption of educational uses of IT.

3. Data Used and Additional Variables' Definition

The article is based on a questionnaire survey that covered 82 teachers from 8 schools of UO. Table 1 provides a breakdown of survey participants.

Table 1. Teachers who participated in the survey (sampling)

Schools or affiliated institutes	Number	Participants	Particicaption rate
Langues, Arts et Communication	58	**17**	29%
Sciences Économiques et de Gestion	43	**17**	40%
Sciences Juridiques et Politiques	24	**11**	46%
Sciences Exactes Appliquées	54	**11**	20%
Institut Burkinabé des Arts et Métiers	27	**3**	11%
Sciences de la Vie et de la Terre	47	**11**	23%
Sciences Humaines	41	**6**	15%
Sciences de la Santé	79	**6**	8%
Total	**373**	**82**	**22%**

Source: DAOI, 2007.

The participation rate was 22%, a qualified representative rate under the random drawing method of the respondents. The Table 2 presents the sample of participating teachers according to their age and higher diploma obtained.

Table 2. Distribution of participating teachers according to their age and the most advanced degree

Advanced degrees	Âge of participating teachers							Total
	[25,30]	[30,35]	[35,40]	[40,45]	[45,50]	[50,55]	[55,62]	
Doctorat d'État	0	1	2	3	2	5	5	**18**
Doctorat Unique	0	6	11	6	4	4	1	**32**
Doctorat de 3ème cycle	0	0	1	1	2	2	5	**11**
Dea/Dess/Master	3	10	5	1	0	0	2	**21**
Total	**3**	**17**	**19**	**11**	**8**	**11**	**13**	**82**

Source: Study sampling.

In the African and Malagasy Council of Higher Education (CAMES) countries, teachers are recruited on the basis of the higher academic degree (Doctorat or Ph.D). In the sampling of this study, 74% of the participating teachers have obtained a Ph.D in different sciences. The 26% of teachers who obtained a Master degree are mostly doctoral students and support the teachings in different schools or affiliated institutes of the University of Ouagadougou.

Data collected from teachers include three components of information: (i) information on the occupational characteristics of teachers (age, gender, diploma, degree or interests, subjects taught, etc.), (ii) on their use of computers and the Internet (time and weekly frequency of use), and (iii) the determinants of IT's acceptance and educational uses. Reliability constructs was tested by the Crondach alpha coefficients with estimated values between 0.70 and 0.91.

The model has five direct determinants: IT's performance expectancy, effort expectancy, social influence, facilitating conditions and its acceptance by teachers. These determinants are constructs of several elements (items) of issues identified on the Likert scale. The behavioral intention or acceptance of the technology is both endogenous and exogenous variable in the TUAUT model. The model specifies two endogenous variables.

The first is about acceptance also called behavioral intention that is the fact of accepting, that is to say the intention planned to adopt the technology or not to accept the technology. Measuring behavioral intention includes intention, prediction and planned IT use by teachers, the item "It would be much better for me to use IT to achieve my teaching activities in addition to traditional methods over the next 12 months" allows measuring this variable. The response to this item has five categories of the Likert scaleranging from 0 to 4. This multinomial variable was transformed into dummy variable (xi) defined as follows:

$(xi) \leq 2, (xi)=0$

$(xi) > 2, (xi)=1$

The second endogenous variable concerns specific educational use of IT.F or Basque (2004), specific educational usages fairly representative in university teaching are: (i) the use of a spread sheet, (ii) the use of an email program, (iii) the use of software presentation, (iv) the use of Webpage editing software, (v) the use of images or pictures editing software, and (vi) the use of specific software to the subject taught by the teacher. These six endogenous variables are defined either by closed questions "yes" or "no" or with questionson Likert scale from 0 to 4, transformed into dichotomous dummy variables. The assumptions about the relationship to be estimated are:

H1. There would exist a significant positive direct relationship between the age of professors and acceptance of IT in UO.

H2. There would exist a significant positive direct relationship between Internet experience of teachers and their acceptance of IT in UO.

H3. There would exist a significant positive relationship between the expected performance of ICT by teachers of UO and their acceptance of IT.

H4. There would exist a significant positive relationship between the expected effort of the use of IT by teachers and their acceptance of IT.

H5. There would exist a significant positive relationship between social influence and acceptance of IT by teachers of this university.

H6. There would exist a significant negative relationship between facilitating conditions of ITs and their acceptance of IT.

H7. There would exist a significant positive relationship between the acceptance of ICT by teachers and their adoption of telematics applications of IT (MS Excel, MS Power Point, image editing software, Web page editing software, email, specific software related to subjects taught by professors), this relationship will be moderated positively by their Internet experience and age.

H8. There would exist a significant negative relationship between the facilitating conditions and their adoption of telematics applications of IT by teachers' view the low quality of infrastructure technology at UO; and this relationship will be moderated positively by their Internet experience and age.

H9. There would exist a significant positive direct relationship between Internet experience of teachers and their adoption of telematics applications of ICT by teachers to use.

4. Presentation of the Results of TUAUT Model

Tables 3 and 4 present the estimated parameters of acceptance and specific educational uses of IT by teachers of UO. In Table 3, only the coefficients δi are presented since the coefficients βi are not used in the interpretations.

Table 3. Marginal effects δ model for the characteristics of the probability of Y=1 (accept ICT). Between brackets are the standard errors of the variables Xi

Exogeneous Variables (Xi)	Coefficients (δ_i)	Average ($\bar{x}_i$)
Intercept	-0,004 (0,31)	
Moderating variables (direct effects)		
LOG(AGE)	-0,191 (0,11)*	3,76
TPINTE_C	0,013 (0,01)***	11,90
Performance Expectancy (1)		
Perceived usefulness (1.1)		
Q35AV	-0,088 (0,06)	3,17
Q35AO	0,064 (0,04)*	3,06
Q35AP	0,050 (0,02)***	2,05
Q37BU	0,012 (0,04)	3,18
Q37BV	0,052 (0,03)*	2,17
Q39CJ	0,090 (0,05)*	3,41
Expected results(1.2)		
Q35AU	0,080 (0,04)**	2,56
Q39CH	0,121 (0,05)**	2,93
Q41ID	0,133 (0,06)**	2,87
IT Compatibility to educational use (1.3)		
Q41IA	-0,134 (0,05)**	2,72
Q41IC	0,078 (0,05)	2,89
Q41IF	-0,049 (0,03)*	2,67
Motivation (1.4)		
Q38BM	-0,061 (0,05)	3,43
Q38BP	0,091 (0,06)	3,01
Q38BQ	-0,101 (0,04)**	3,04
Q38BR	0,010 (0,02)	2,89
Q38BT	-0,001 (0,02)	2,59
Q37BW	-0,082 (0,05)*	2,91
Facilitating conditions (2)		
Q36BB	-0,036 (0,02)*	1,28
Q36BC	0,011 (0,02)	0,85
Q36AW	0,044 (0,03)	1,59
Q36AX	-0,085 (0,04)**	1,16
Effort Expectancy (3)		
Q36BD	-0,052 (0,03)*	2,04
Q36BE	0,027 (0,03)	2,83

Q39CI	-0,076 (0,05)*	3,12
Social or peer influence (4)		
Q33AE	0,031 (0,04)	3,11
Q33AG	-0,065 (0,05)	2,56
Q33AJ	0,043 (0,02)**	1,49
Q32A	0,100 (0,05)**	1,91
Q32B	0,077 (0,04)*	1,63
Q32C	0,011 (0,02)	2,20

Pseudo R2 de McFadden=0,63/Pseudo R2of ML=0,53

χ2=6 2,20-Degree of freedom=33-Significance=0,0016

*=Significant at level 10%; **=Significant at level 5% et ***=Significant at level 1%.

Table 4. Marginal effects of δ TUAUT model for the characteristics of the probability of Y=1 (educational use of specific software below). Between brackets, standard errors of the variables Xi

Exogeneous Variables (Xi)	**MS Excel**	**Email softwares**	**Pictures editing softwares**	**PowerPoint**	**Web pages editing softwares**	**Specific softwares to professor's skills**	**Average value $\overline{X_i}$**
	δ_i	δ_i	δ_i	δ_i	δ_i	δ_i	
Intercept	1,1876 (1,2247)	0,8310 (1,3886)	1,9380 (2,3700)	1,421 (1,4643)	1,244 (0,881)	1,1785 (2,008)	
Behavioral Intention	0,1784 (0,0945)*	0,2423 (0,1382)*	0,3250 (0,1655)**	0,104 (0,1091)	-0,003 (0,126)	0,5901 (0,274)**	0,71
Log (Age)	-0,4299 (0,3371)	-0,2469 (0,3672)	-0,6378 (0,6261)	-0,425 (0,3917)	-0,393 (0,230)*	-0,4649 (0,536)	3,76
Tpinte_c = Internet Experience	0,0549 (0,0167)**	0,0163 (0,0090)*	0,0433 (0,0178)**	0,034(0,0102)***	0,005 (0,002)**	0,0166 (0,013)	11,90
Q36BB	-0,2955 (0,1688)*	-0,2821 (0,2462)	-0,8739 (0,3435)***	-0,250 (0,1760)	0,081 (0,160)	-0,7428 (0,409)*	1,28
Q36BC	0,3479 (0,3807)	0,3220 (0,3220)	-0,0491 (0,6706)	0,847 (0,5976)	-0,020 (0,278)	1,0517 (0,714)	0,85
Q36AW	0,2872 (0,2924)	0,4696 (0,5393)	1,8215 (0,8587)**	0,116 (0,4620)	0,188 (0,188)	0,3734 (0,604)	1,59
Q36AX	-0,5339 (0,3927)	-0,5609 (0,5925)	-1,9597 (1,0077)**	-0,237 (0,5146)	-0,604 (0,356)*	-0,4557 (0,704)	1,16
AGE*Q36BB	0,0079 (0,0040)**	0,0063 (0,0051)	0,0174 (0,0068)***	0,005 (0,0032)	0,000 (0,003)	0,0129 (0,008)	58,12
AGE*Q36BC	-0,0103 (0,0094)	-0,0050 (0,0142)	-0,0035 (0,0150)	-0,018 (0,0129)	0,000 (0,007)	-0,0208 (0,016)	37,49
AGE*Q36AW	-0,0035 (0,0059)	-0,0105 (0,0105)	-0,0327 (0,0166)**	-0,002 (0,0091)	-0,006 (0,004)	-0,0060 (0,013)	71,18
AGE*Q36AX	0,0124 (0,0088)	0,0120 (0,0122)	0,0431 (0,0216)**	0,008 (0,0105)	0,016 (0,009)*	0,0088 (0,016)	50,77
TPINTE_C*Q36BC	-0,0493 (0,0361)	0,0175 (0,0343)	0,0232 (0,0750)	-0,058 (0,0394)	-0,067 (0,047)	-0,0427 (0,047)	11,52
TPINTE_C*Q36AW	-0,0239 (0,0320)	-0,1001 (0,0529)*	-0,2178 (0,0809)***	-0,049 (0,0513)	-0,019 (0,017)	-0,0449 (0,052)	17,76
TPINTE_C*Q36AX$	0,0716 (0,0493)	0,1248 (0,0582)**	0,3454 (0,1164)***	0,075 (0,055)	0,104 (0,054)*	0,0645 (0,062)	14,62
TPINTE_C*AGE*Q36BB	-0,0003 (0,0002)*	-0,0001 (0,0002)	0,0001 (0,0003)	0,000 (0,0002)	0,000 (0,001)*	0,0001 (0,001)	714,29
TPINTE_C*AGE*Q36BC	0,0015 (0,0009)*	-0,0004 (0,0007)	-0,0003 (0,0017)	0,001 (0,0008)	0,002 (0,001)	0,0009 (0,001)	502,63
TPINTE_C*AGE*Q36AW	0,0001 (0,0006)	0,0020 (0,0010*	0,0039(0,0016)**	0,001 (0,0010)	0,000 (0,000)	0,0007 (0,001)	783,07
TPINTE_C*AGE*Q36AX	-0,0016 (0,0011)	-0,0026 (0,0012)**	-0,0076(0,003)***	-0,002 (0,0012)	-0,003 (0,001)**	-0,0014 (0,001)	632,98
Pseudo R^2 de McFadden	0,452	0,322	0,381	0,370	0,334	0,25	
Pseudo $R^2$of ML	0,451	0,323	0,403	0,355	0,281	0,29	
χ^2	49,15 (Dl=18)***	31,93 (Dl=18)***	42,35 (Dl=18)***	35,97(Dl=18)***	27,06 (Dl=18)***	27,67 (DL=18)*	

*=Significantat level 10%; **=Significantat level 5% et ***=Significantat level 1%.

4.1 The Probability of Accepting IT and the Educational Use of IT

Table 5 shows the predicted probabilities of acceptance and use of its specific applications by teachers in their teaching practices to UO.

Table 5. Predicted probabilities of acceptance and specific educational uses

Designation	**Prob[Y=1]**
Behavioral intention or acceptance of IT	0,73
Use of (MS Excel)	0,61
Use of email	0,77
Use of image editing software	0,60
Use of presentation software	0,77
Use of web editing software	0,11
Use of specific software of subject taught	0,37

The predicted probability of acceptance of IT by teachers UO is 0.73 indicating that 73% of professors of this university have an intention planned to adopt IT. The probability predicts the use of specific IT applications (software) such as MS Excel, MS Power Point, e-mail software and those of image editing is at least equal to 0.60 indicating that these telematic applications are used by at least 60% of the professors of this university. Presentation software and e-mail had the highest predicted probability of use (77%). The probability remains low for the respective use of specific software for the subject taught and the Web page editing software with respectively 37% and 11% of teachers. Publishing web pages require computer software high-level skills and their use requires a significant investment of time, thus constraining their use. All these softwares are described as cognitive potential tools (Depover, Karsenti, & Komi, 2009).

4.2 Determinants of Teachers' Acceptance of IT

60% of the marginal effects (δi) estimated on the acceptance were significant. In economics, the variable "age" is always assumed to have a direct effect on the studied phenomenon. Age captures a certain culture, a history of the individual in relation to the age of onset of innovation. The coefficient iδ estimated of age is significant of negative sign: the age of teachers negatively affects their acceptance of IT, which indicates a greater acceptance of IT among younger teachers.

The Internet experience positively affects the probability of accepting IT among teachers. Thus, an enhanced Internet experience that is to say, a greater frequency of Internet use corresponds to a higher probability of teachers more to accept IT in their teaching practices.

Figure 3 summarizes the effect of the determinants of TUAUT model on the acceptance of IT.

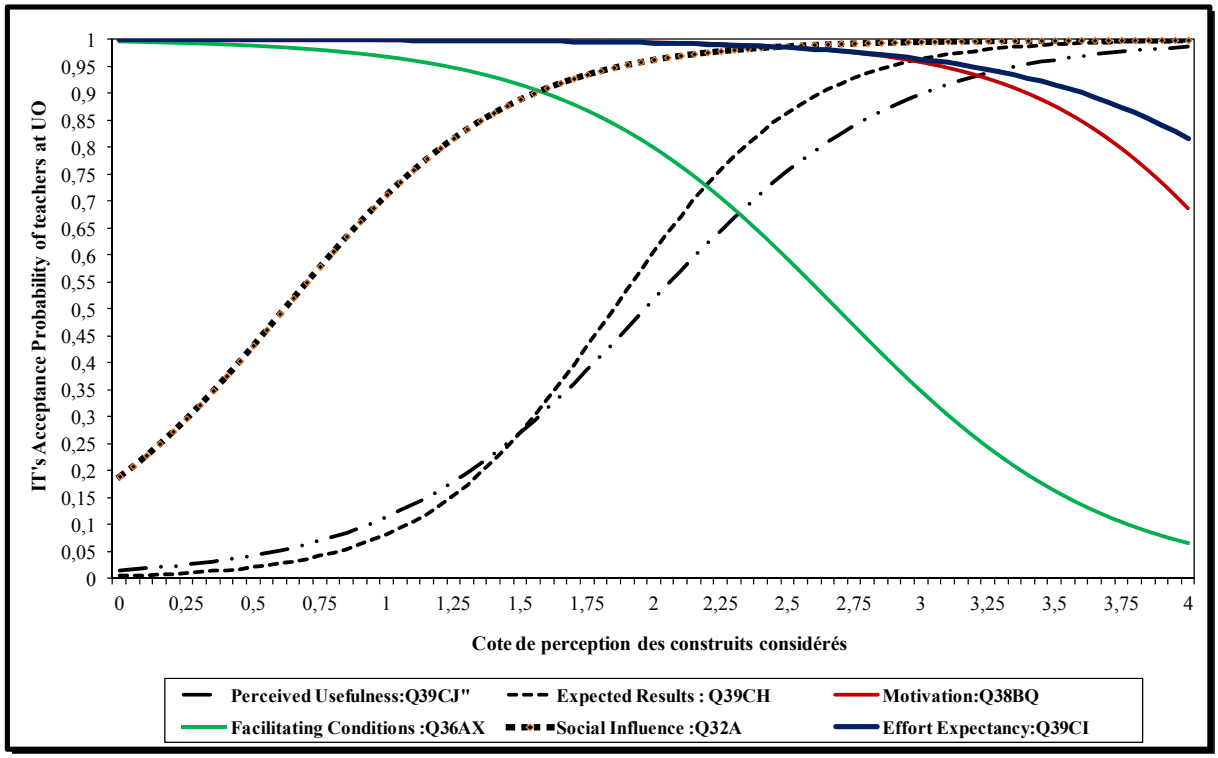

Figure 3. The determinants of IT's acceptance by teachers at UO

This figure reveals a significant positive influence of the performance expectancy of IT by teachers, influence seized by perceived usefulness constructs, expected results and social influence on their acceptance of IT while constructs facilitating conditions, Effort expectancy and Motivation negatively affect this acceptance.

4.3 The Determinants of Teachers' Specific Educational Uses of IT

More than 32% of the estimated parameters δi of TUAUT model are statistically significant.

4.3.1 The Impact of Acceptance of IT on Educational Use

Venkatesh et al. (2003) assume that the probability of accepting IT has a significant positive impact on the use of technology. This probability has had a positive effect on the use of 4 of the 6 categories of software used by teachers (see Figure 3).

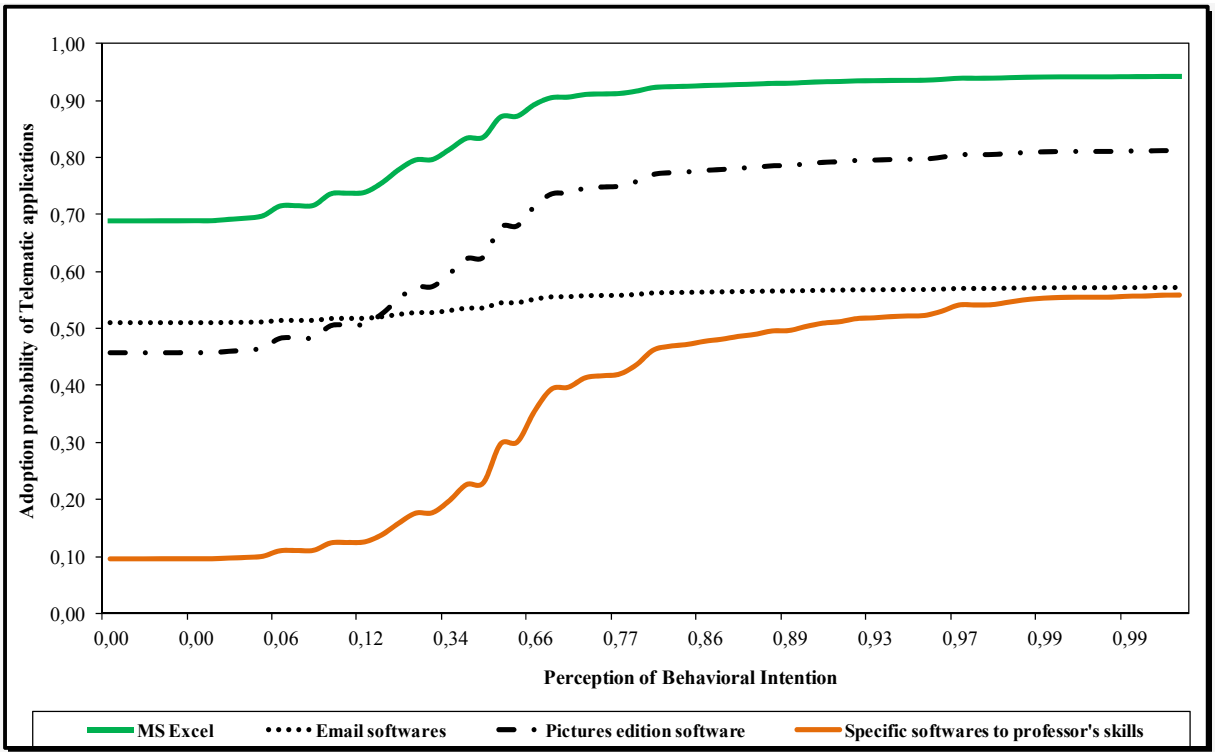

Figure 4. The impact of acceptance on specific educational uses

The estimated δi coefficients indicate that a 1% increase in the acceptance of IT of teachers respectively increases by 0.18% the probability of using MS Excel, 0.24% the probability of using e-mail, 0.33% of using an image editing software and 0.59% of using a specific software of subjects taught. Also, the acceptance of technology proves to be an essential condition prior to the success of any technology diffusion project.

4.3.2 The Impact of Facilitating Conditions on the Educational Use

Figures 4 and 5 show the effects of the construct "facilitating conditions" on the adoption of specific software of IT through a change of its items Q36BB and Q36AX. The item Q36BB captures the perception of teachers on the speed of Internet network at the UO in relation to teaching and research activities of teachers; and the item Q36AX on the existence of adequate technical support available when teacher has a technical problem.

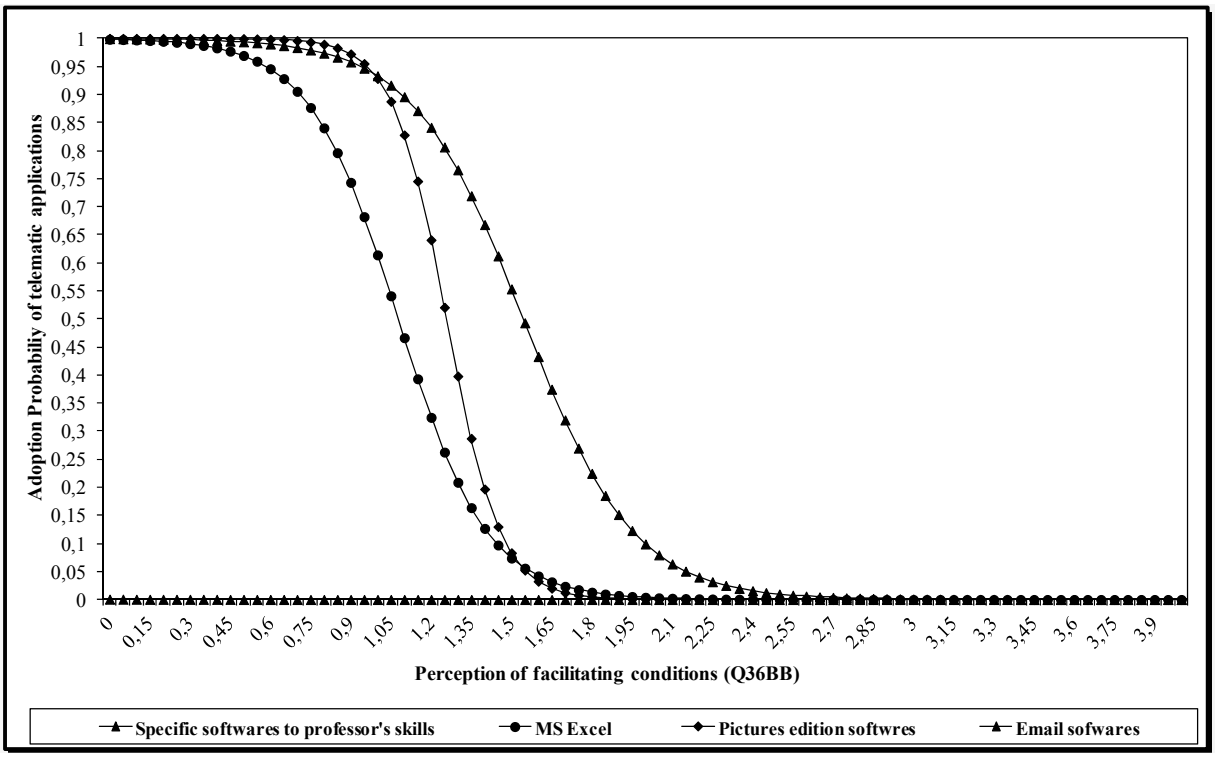

Figure 5. The impact of facilitating conditions (Q36BB) on the educational uses of IT

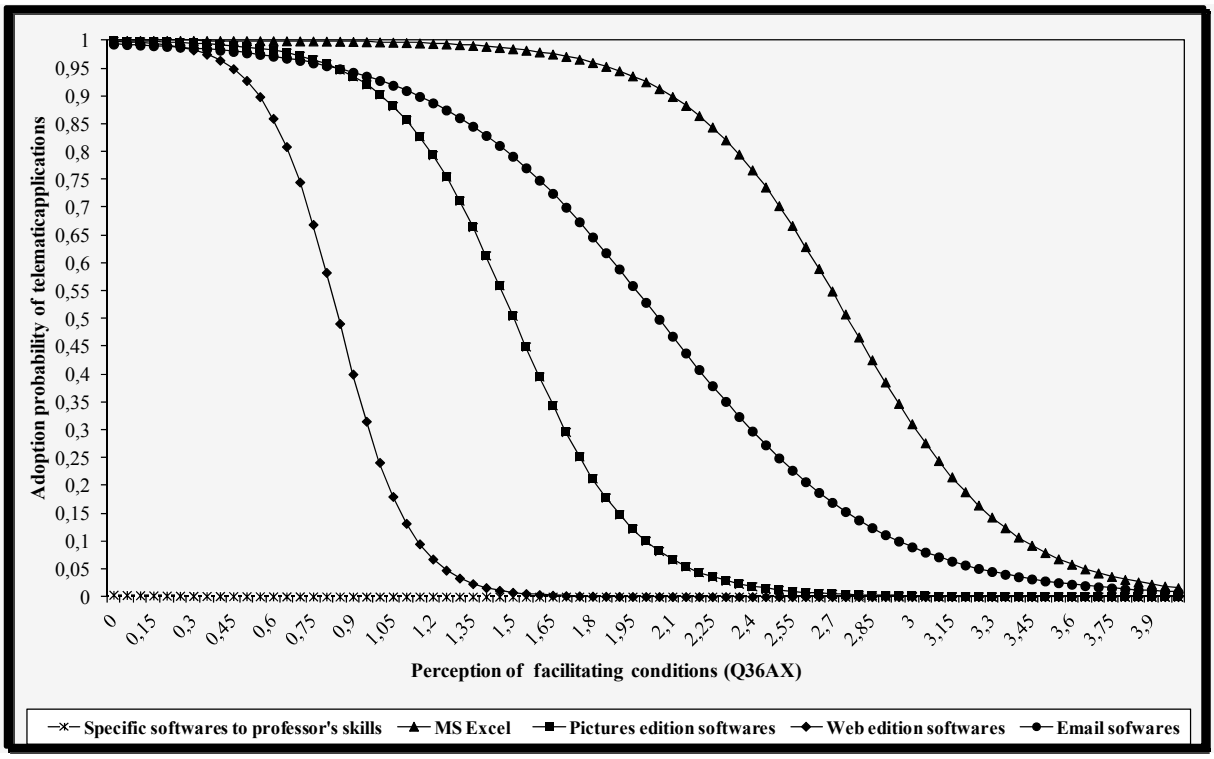

Figure 6. The impact of facilitating conditions (Q36AX) on the educational use of IT

The coefficients i indicates that an increase of one point on the rating of teachers perception of these two items causes a respective decrease of 0.29 point, and 0.53 point the probability of using MS Excel, 0.87 points and 1.96 to use image editing software, 0.74 points to use aweb editing software and 0.60 points using a specific

software for the subject taught. The teachers have had a low average rating of perception for the quality of the technological infrastructure (1.28 on a scale from 0 to 4) but also for the existence of adequate technical assistance at the UO to support the educational uses of IT (1.16 on a scale from 0 to 4) which is reflected on the estimators of this construct.

4.3.3 Direct and Moderating Effects of Age and Internet Experience of Professors

The Internet experience of teachers has had a positive direct impact and significant on the use of 5 of the 6 specific software used. These influences of Internet experience on these uses are illustrated in Figure 7.

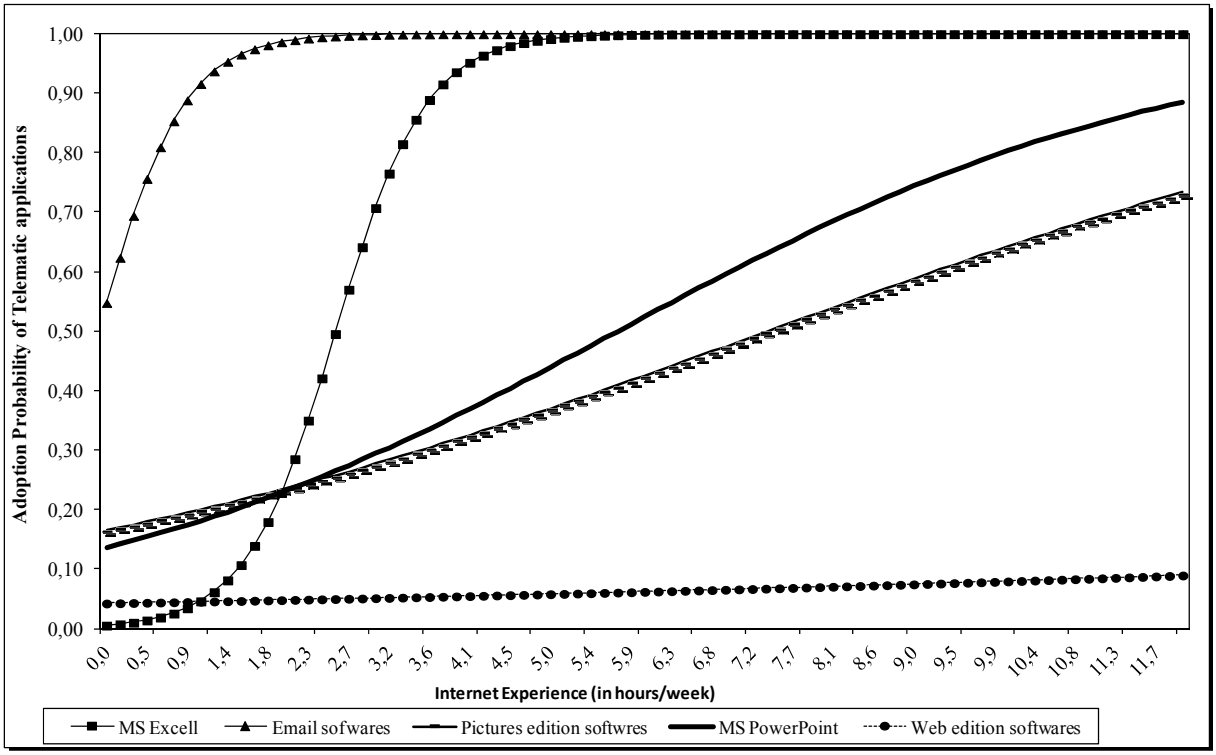

Figure 7. The direct impact of the Internet experience on the adoption of specific telematics applications

In fact, a 1% increase inweekly schedule of Internet use has respectively led to respective increases of (i) 0.06% the probability of using MS Excel, (ii) of 0.02% of using e-mail, (iii) of 0.04% of using of image editing software, (iv) 0.03% using presentation software, and (v) 0.01% using a web page editing software among teachers of UO. The lower impact of this variable is observed on the adoption of editing software Web pages.

Indirect effects of age and Internet experience, moderating effects on the facilitating conditions were significant on the educational uses of IT. Indeed, age (variables (Q36BBx Age) and (Q36Axx Age) moderates significantly and positively the facilitating conditions. Experience of the Internet (the variable (TPINTE_CxQ36AX)) moderates significantly and positively the facilitating conditions.

5. Elements of Discussion and Conclusion

The TUAUT model allowed the identification and the assessment of the determinant variables of acceptance of IT and the use of specific software by professors at UO.

The model results helped in explaining 64% of the total variance of the acceptance of IT by teachers. 6 estimated equations of specific software uses have had an explanatory power between 25% and 45% of the total variance of these uses. In addition, the validity of the individual coefficients estimated is between 54% to 65% of all the coefficients of the TUAUT model. These adequacy and validity tests of the model show that the results can be used for forecasting purposes and policies of integration of IT. Indeed, Venkatesh et al. (2003) showed that this model explains more than 70% of the total variance of the acceptance and the use of technology.

The estimated coefficient δ of variable age negatively affects the acceptance of IT (P<0.10), indicating that this one is higher among younger teachers.

Constructs of perceived usefulness and expected results of the main construct "performance expectancy" have positively affected the acceptance of IT (P<0.05) while its other two constructs, the compatibility of IT and extrinsic motivation of teachers have negatively influenced the acceptance of IT when they were supposed to positively influence it (Venkatesh et al., 2003; Venkatesh et al., 2004; Davis, Bagozzi, & Warshaw, 1989).

The construct effort expectancy of the IT use negatively influenced the acceptance of ICT of teachers (P<0.10). Indeed, an expected significant effort perceived by teachers will correspond to low levels of technology acceptance. This is explained by the fact that the educational use of IT requires from teachers a significant investment in time and money to digitize course materials and prepare for example presentation slides. Whether to create course websites and/or Web deposits, it is further complicated for the teacher.

The construct social influence positively affected the acceptance of IT (P<0.05). This influence reflects the influence of the positive vision that has the academic community's on the educational use of IT on their behavior of acceptance of IT. This construct contains the explicit or implicitnotion that the behavior of IT adoption is positively influenced by how teachers believe that others feel well having used the technology. This confirms the work of Venkatesh et al. (2003).

The facilitating conditions have had a negative impact on the acceptance of ICT by teachers (P<0.05). These are the objective factors in the institution that observers agree that they make easy to accomplish an act or task (Thompson et al., 1991) and capture the quality of the technology infrastructure of UO and the existence of technical support for teachers. Indeed, the construct has had a negative effect on the acceptance of ICT because the average rating perception of the existence of this technical assistance is low and varies between 0.85 and 1.59 on a likert scale of 5. However, "facilitating conditions" has a very positive effect on teachers e-learning acceptance at the University of Goce Delcev since 79.62% of surveyed teachers have recognized to have the necessary resources to use the system and also said that their university has a department for support that is available to users who need help (Kocaleva et al., 2015, pp. 27-28).

The adoption of four specific software (MS Excel, Email software, the graphic editing software and specific software of the subject taught) was positively impacted by the acceptance of IT by teachers (P<0.05). This further confirms the fact that the acceptance of technology by users is essential in the process of technology diffusion.

The facilitating conditions have had a significant negative effect on the specific uses of IT by teachers (P<0.10). The very low quality of technology infrastructure of UO explains this fact; the teachers have a very bad perception of the quality of this infrastructure. However, age and Internet experience of teachers have had a positive moderating effect on facilitating conditions: The Internet experiencehas a positive and significant direct effect on all specific use of it studied (P<0.10). The "age" does not have a significant direct effect on the use of web page editing software.

Overall, the acceptance of IT, the expected performance of IT, the facilitating conditions and the internet experience of teachers have had expected direct effects of the TUAUT model. The age and Internet experience positively moderates the influence of facilitating conditions on educational uses. Almost all formulated assumptions about acceptance and the specific uses of IT have been proven even if the one made on the direct effect of age, on the acceptance was negative.

The limit of this work is not taken into account in the model TUAUT of specific characteristics of telemetric applications (software) and the level of control by the users of software like exogenous variables (Venkatesh et al., 2003; Karahanna & Straub, 1999; Venkatesh et al., 2000). For example, the use of Power Point requires the existence of adequate infrastructure: video projectors and giant screens in the classroom. Other authors have considered the possibility of introducing the characteristics of the system and its self-efficacy as a determinant using the system (Goodhue & Thompson, 1995; Colquitt, LePine, & Noe, 2000).

The results of the TUAUT model may therefore help to develop an appropriate policy for IT introduction at the University of Ouagadougou. As indicated by Venkatesh et al. (2003, p. 470.): "The TUAUT model highlights and illuminates the importance of contextual analysis in the development of strategies for the implementation of new technologies in organizations".

These results recommend greater involvement of university authoritarian and that of the supervisory ministry to promote better use of ITs by teachers mainly by improving existing technology infrastructure but also by

providing support and an appropriate technical assistance to teachers to encourage emulation of ITs educational uses at the University of Ouagadougou.

References

Agarwal, R., & Prasad, J. (1999). Are individual differences germane to the acceptance of new information technologies? *Decision Sciences*, *30*(2), 361-391. https://doi.org/10.1111/j.1540-5915.1999.tb01614.x

Agbobli, C. (2002). Je surfe donc je sais: Quelles formes de développement de l'éducation avec les Nouvelles Technologies de l'Information et de la Communication en Afrique ? In *Globalisme et Pluralisme*.

Ajzen, I. (1991). The theory of planned behaviour. *Organizational Behavior and Human Decision Processes*, *50*(2), 179-211. https://doi.org/10.1016/0749-5978(91)90020-T

Alawadhi, S., & Morris, A. (2008). *The Use of the UTAUT Model in the Adoption of E-government Services in Kuwait*. 41st Hawaii International Conference on System Sciences. https://doi.org/10.1109/hicss.2008.452

Anderson, J., & Schwager, P. (2004). *SME adoption of wireless LAN technology: Applying the UTAUT model* (pp. 39-43). 7th Annual Conference of the Southern Association for Information System, Savannah, Georgia.

Basque, J. (2004). Une réflexion sur les fonctions attribuées aux TIC en enseignment universitaire. *Revue Internationales des technologies en pédagogie universitaire*, *2*(1), 30-41. https://doi.org/10.18162/ritpu.2005.66

Carter, L., & Belanger, F. (2005). The utilization of e-government services: Citizen trust, innovation and acceptance factors. *Information Systems Journal*, *15*(1), 5-25. https://doi.org/10.1111/j.1365-2575.2005.00183.x

Chickering, A. W., & Gamson, Z. (1987). Seven principles for good practice in undergraduate education. *AAHE Bulletin*, *40*(7), 3-7.

Colquitt, J. A., Lepine, J. A., & Noe, R. A. (2000). Toward an Integrative Theory of Training Motivation: A Meta-Analytic Path Analysis of 20 Years of Training Research. *Journal of Applied Psychology*, *85*(5), 678-707. https://doi.org/10.1037/0021-9010.85.5.678

Compeau, D. R., Higgins, C. A., & Huff, S. (1999). Social Cognitive Theory and Individual Reactions to Computing Technology: A Longitudinal Study. *MIS Quarterly*, *23*(2), 145-158. https://doi.org/10.2307/249749

Davis, F. D. (1989). Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. *MIS Quarterly*, *13*(3), 319-339. https://doi.org/10.2307/249008

Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989). User Acceptance of Computer Technology: A Comparison of Two Theoretical Models. *Management Science*, *35*(8), 982-1002. https://doi.org/10.1287/mnsc.35.8.982

Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1992). Extrinsic and Intrinsic Motivation to Use Computers in the Workplace. *Journal of Applied Social Psychology*, *22*(14), 1111-1132. https://doi.org/10.1111/j.1559-1816.1992.tb00945.x

Delgi. (2004). *Stratégie d'opérationnalisation du plan de développement de l'infrastructure nationale de l'information et de communication: Annexes E/Fiches de Programmes et projets*. Adopté par le Conseil des Ministres à Ouagadougou le 13 octobre 2004.

Dieng, P. Y. (2004). Constitution d'une expertise technique et pédagogique durable en matière des TIC en éducation. In *Conférence sous-régionale sur l'intégration des TIC dans l'éducation en Afrique de l'Ouest: Problèmes et défis*. ADEA, Document de Travail.

Duckworth, J. (2001). Notschool.net research phase-final report. Education. In *Washington D.C. Education: An International Reference Handbook*. Bloomington: Indiana University.

Goodhue, D. L., & Thompson, R. L. (1995). Task-Technology Fit and Individual Performance. *MIS Quarterly*, *19*(2), 213-236. https://doi.org/10.2307/249689

Greene, H. W. (1993). *Econometric Analysis*. Macmillan Publishing Company.

Harris, S., & Kington, A. (2002). *Innovative classroom practice using ICT in England: The Implications for schools*.

Hung, S. Y., Chang, C. M., & Yu, T. J. (2006). Determinants of user acceptance of the e-government services: The case of online tax filing and payment system. *Government Information Quarterly*, *23*, 97-122. https://doi.org/10.1016/j.giq.2005.11.005

Jiang, J. J., Hsu, M. K., Klein, G., & Lin, B. (2000). Ecommerce user behaviour model: An empirical study. *Human Systems Management*, *19*, 265-276.

Karahanna, E., Straub, D. W., & Chervany, N. L. (1999). Information Technology Adoption Across Time: A Cross-Sectional Comparison of Pre-Adoption and Post-Adoption Beliefs. *MIS Quarterly*, *23*(2), 183-213. https://doi.org/10.2307/249751

Karsenti, T. (2006). Comment favoriser la motivation et la persévérance des étudiants dans les FOAD: Stratégies pédagogiques pour l'Afrique. *Bulletin de l'UNESCO—IIRCA*, *8*(1), 7-12.

Karsenti, T., & Larose, F. (2005). Introduction. Intégration des TIC et travail enseignant. Quand la société change, la classe doit-elle suivre? In *L'intégration pédagogique des TIC dans le travail enseignant*. Québec: Presses de l'Université du Québec.

Karsenti, T., Komis, V., & Depover, C. (2009). Les nouveaux outils et les nouvelles pratiques de recherche issus des technologies de l'information et de la communication. In D. C. Depover (Ed.), *La recherche en technologie éducative: Un guide pour découvrir un domaine en émergence* (pp. 31-51). Paris, France: Éditions des archives contemporaines, AUF.

Karsenti, T., Savoie-Zajc, L., & Larose, F. (2001). Les futurs enseignants confrontés aux TIC: Changement dans l'attitude, la motivation et les pratiques pédagogiques. *Éducation et francophonie*, *29*(1), 1-29.

Kocaleva, M., Stojanovic, I., & Zdravev, Z. (2015). Model of e-Learning Acceptance and Use for Teaching Staff in Higher Education Institutions. *I.J. Modern Education and Computer Science*, *7*(4), 23-31. https://doi.org/10.5815/ijmecs.2015.04.03

Lebrun, N., & Berthelot, S. (1994). *Plan pédagogique: Une démarche systématique de planification de l'enseignement*. Ottawa: Éditions Nouvelles/De Boeck.

Legendre, R. (1993). *Dictionnaire actuel de l'éducation* (2nd ed.). Montréal/Paris: Guérin/Eska.

Lin, J., Chan, H., & Jin, Y. (2004). Instant messaging acceptance and use among college students. In *The 7th Pacific Asia Conference on Information Systems* (pp. 181-194). Cairns, Australia.

Lu, J., Yu, C. S., Liu, C., & Yao, J. E. (2003). Technology acceptance model for wireless Internet. *Internet Research: Electronic Networking Applications and Policy*, *13*(3), 206-222. https://doi.org/10.1108/10662240310478222

Maddala, G. S. (1985). *Limited and dependent variables in econometrics*. Cambridge University, New York, USA.

Maddala, G. S. (1992). *Introduction to econometrics* (2nd Ed.). Prentice-Hall International, USA.

Moore, G. C., & Benbasat, I. (1991). Development of an Instrument to Measure the Perceptions of Adopting an Information Technology Innovation. *Information Systems Research*, *2*(3), 192-222. https://doi.org/10.1287/isre.2.3.192

Mvoto, M. C. (2006). Culture institutionnelle et apprentissage en ligne en Afrique subsaharienne francophone: Le cas d'une école normale supérieure camerounaise. *International Journal of Technologies in Higher Education*, *3*(3), 49.

Okebukola, P. (2001). *Future Directions of Higher Education in Sub-Saharan Africa*. UNESCO/NUC Regional Conference, Abuja, Nigeria.

Passey, D. (2000). Anytime, Anywhere Learning (AAL) Project Evaluation End of First Year Implementation. In *Summary Report*. Lancaster: Lancaster University/AAL.

Pinto, J., & Mantel, S. (1990). The causes of project failure: IEEE Transactions. *Engineering Management*, *37*(4), 267-269. https://doi.org/10.1109/17.62322

Plouffe, C. R., Hulland, J. S., & Vandenbosch, M. (2001). Research Report: Richness Versus Parsimony in Modeling Technology Adoption Decisions—Understanding Merchant Adoption of a Smart Card-Based Payment System. *Information Systems Research*, *12*(2), 208-222. https://doi.org/10.1287/isre.12.2.208.9697

Romer, M. P. (1990). Endogeneous Technological Change. *Journal of Political Economy*, *98*(5), 71-102. https://doi.org/10.1086/261725

Rosen, P. (2005). *The effect of personal innovativeness on technology acceptance and use* (PhD Thesis). Oklahoma State University.

Russell, T. L. (1999). *The no-significant difference phenomenon*. Raleigh, NC: North Carolina State University (NCSU) Office of Instructional Telecommunications.

Sauve, L., Wright, A., & St-Pierre, C. (2004). Formation des formateurs en ligne: Obstacles, rôles et compétences. *Revue Internationales des technologies en pédagogie universitaire*, *1*(2), 14-20. https://doi.org/10.18162/ritpu.2004.45

Schacter, D. L. (1999). The seven sins of memory: Insights from psychology and cognitive neuroscience. *American Psychologist*, *54*, 182-203. https://doi.org/10.1037/0003-066X.54.3.182

Taylor, S., & Todd, P. A. (1995a). Assessing IT Usage: The Role of Prior Experience. *MIS Quarterly*, *19*(2), 561-570. https://doi.org/10.2307/249633

Taylor, S., & Todd, P. A. (1995b). Understanding Information Technology Usage: A Test of Competing Models. *Information Systems Research*, *6*(4), 144-176. https://doi.org/10.1287/isre.6.2.144

Thebault, G. (2009). *Les TIC dans l'enseignement supérieur sénégalais: Innovation et extraversion d'une institution*. Centre d'Etude d'Afrique Noire (CEAN).

Thompson, R., Higgins, C., & Howell, J. (1991). Personal computing: Toward a conceptual model of utilization. *MIS Quarterly*, *15*(1), 124-143. https://doi.org/10.2307/249443

Triandis, H. C. (1980). Values, attitudes, and interpersonal behaviour. *Nebraska Symposium on Motivation*, *27*, 195-259.

UNESCO. (2003). *Développements récents et perspectives de l'enseignement supérieur en Afrique subsaharienne au 21ème siècle*. Réunion des partenaires de l'enseignement supérieur, Paris.

Venkatesh, V. (1999). Creating Favorable User Perceptions: Exploring the Role of Intrinsic Motivation. *MIS Quarterly*, *23*(2), 239-260. https://doi.org/10.2307/249753

Venkatesh, V. (2000). Determinants of Perceived Ease of Use: Integrating Perceived Behavioral Control, Computer Anxiety and Enjoyment into the Technology Acceptance Model. *Information Systems Research*, *11*(4), 342-365. https://doi.org/10.1287/isre.11.4.342.11872

Venkatesh, V., Morris, M., & Ackerman, P. (2000). A longitudinal field investigation of gender differences in individual technology adoption decision-making process. *Organizational Behaviour and Human Decision Processes*, *83*(1), 33-60. https://doi.org/10.1006/obhd.2000.2896

Venkatesh, V., Morris, M., Davis, G., & Davis, F. (2003). User acceptance of information technology: Toward a unified view. *MIS Quarterly*, *27*(3), 425-478.

Venkatesh, V., Morris, M., Sykes, T., & Ackerman, P. (2004). Individual reactions to new technologies in the workplace: The role of gender as a psychological construct. *Journal of Applied Social Psychology*, *34*(3), 445-467. https://doi.org/10.1111/j.1559-1816.2004.tb02556.x