FACTORS AFFECTING DIGITAL MEDIA USES IN HIGHER EDUCATION: THE CASE OF THE UNIVERSITY OF TLEMCEN

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ABSTRACT

This research aims essentially at the study of the factors that determine the pedagogical integration of information and communication technologies (ICT) by teachers at the University of Tlemcen (Algeria). Our work was built around the theoretical concepts relating to the educational uses of ICT and the factors that influence ICT integration in pedagogical tasks. This work starts from this standpoint and seeks to propose objective solutions that are expected to provide relevant elements of thinking about the problematic of the pedagogical integration of ICT in the Algerian universities. That is why we have chosen the University of Tlemcen, among the first Algerian universities and the main promoter institution of higher education in the country, as our main field of research. We propose a conceptual model encompassing the factors that affect ICT integration. The empirical study is conducted with 700 teachers (permanent, temporary and partners) of different fields and faculties of the University of Tlemcen.

KEY WORDS

ICT, Innovation, Higher Education, Factors, Integration

JEL CLASSIFICATION: I, I29.

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العوامل المؤثرة في دمج
تكنولوجيا المعلومات والاتصالات في التعليم العالي: دراسة حالة جامعة تلمسان

ملخص

يركز هذا العمل البحثي بشكل أساسيعلى العوامل التي تحدد التكامل التربوي لتكنولوجيا المعلومات والاتصالات في التعليم العالي، وقد تم بناء هذا العمل حول المفاهيم النظرية المتعلقة باستخدام تكنولوجيا المعلومات والاتصالات في الجامعات الجزائرية.

يبدأ هذا العمل من هذا المنظور ويسعى إلى اقتراح حلول موضوعية من المتوقع أن توفر عناصر ذات صلة بالتفكير حول إشكالية التكامل التربوي لتكنولوجيا المعلومات والاتصالات في الجامعات الجزائرية. نقترح نموذجًا مفاهيميًا يشمل العوامل التي تؤثر على تكامل تكنولوجيا المعلومات والاتصالاتفي التدريس. أجريت الدراسة التجريبية على 700 استاذ (دائم ومؤقت وشركاء) من مختلف المجالات والكليات في جامعة تلمسان

كلمات المفتاحية

تكنولوجيا المعلومات والاتصالات، الابتكار ، التعليم العالي ، العوامل ، التكامل

تصنيف جال:I, I29

LES FACTEURS QUI INFLUENT SUR L'INTEGRATION DES TICS DANS L'ENSEIGENEMENT SUPÉRIEUR : ETUDE DU CAS DE L'UNIVERSITÉ DE TLEMCEN

RÉSUMÉ

Ce travail de recherche porte sur les facteurs qui déterminent l'intégration pédagogiques des TICs dans l'enseignement supérieur. Ce dernier se construit autour des concepts théoriques relatifs à l'usage des TICs dans les universités algériennes. L'objectif de cette étude est d'analyser l'action des enseignants universitaires et leurs pratiques pédagogiques des TICs en classe, Elle a permet de tester les facteurs qui influencent sur les enseignants dans leurs pratiques pédagogiques. A travers une enquête réalisée auprès de 700 enseignants (permanents, vacataires et associés) de différentes facultés de l'université de Tlemcen, nous proposons un modèle conceptuel englobant les variables qui ont un impact sur l'intégration des TICs dans l'enseignement

Mots-clés :

TIC, innovation, enseignement supérieur, facteurs, intégration

JEL CLASSIFICATION: I, I29

INTRODUCTION

The subject of ICT always remains an up-to-date topic of a great importance. Considering the researches made on the subject, we can list multiple reasons advocating ICT integration in the educational environment. The impact of ICT on the production and the spread of scientific knowledge is considerable.

Today, nobody can deny the potential that ICT embody in the development of any country. The educational system is one of the pillars of economic development. While it is known that ICT play a pivotal role in improving education, it is important to dissociate between the technical tool and the pedagogy of work. Success is not an easy thing, in that it requires sacrifices, skills, changes and innovations.

1- LITERATURE REVIEW

During the last decade, teaching, like other areas of activity, has undergone many changes mainly due to the development of information and communication technologies (ICT).

The use of ICT in education plays a crucial role in optimizing the learning process, besides the fact that it enables the learners to gain more autonomy and motivation (VINCENT, 2011). Furthermore, technologies offer extraordinary opportunities to "improve the quality of the learning environment, i.e. the overall conditions that allow learning to take shape, at work, at school or at home" (PAPERT, 1994). In the same context, KIRSCH, 2008 adds : "efficiency of technological tools of education depends mainly on the educational approaches upon which their use was based".

In addition, ICT make the learners more active by encouraging group work. Likewise, learners build together their knowledge through discussions within the group (Poellhuber & boulanger, 2001).

In the same order of ideas, Tardif (1998) argues that ICT play four functions in learning situations. These are: production tools (improvement of the quality of education), communication tools (web, messaging …), tools allowing access to information and to knowledge (websites, documents…) and tools for archiving (storage,…). ICT open thus the learner's mind to other realities.

According to FULLAN in 1994, the use of ICT in educational institutions constitutes a complex techno-pedagogical innovation. Four features affect its implementation: how it meets the needs, its clarity, complexity, and feasibility.

Authors such as KARSENTI (2007), TARDIF and PRESSEAU (1998) believe that there is a relationship between ICT and the way we teach. LECLERC (2003) studied, using the data collected from her research, the perception of participating teachers toward ICT and teaching. According to their perception, teachers must adapt their teaching to the requirements of ICT and in the same time keep a critical spirit vis-à-vis them.

RABY (2013) presents different factors, contextual, institutional, social, pedagogical and personal, which allow explaining how teachers

succeed to optimize the use of ICT in class. RABY notes some peculiarities in the teachers who participated in her research: experienced teachers (between 9 and 24 years of teaching experience), who have a particular conception of teaching and who have previously adopted or have developed, early in their teaching career, a pedagogical approach that has enabled them to easily integrate ICT in their teaching.

LEFEBVRE (2005) shares nearly the same view as that of RABY concerning the relationship between ICT and pedagogy.

LEGENDRE (2005) defines integration as "the action of making various elements interact so as to obtain a harmonious whole of a high level. As for RABY, she asserts that the pedagogical integration of ICT involves a continuous use of ICT in class, by both teachers and students. This use of ICT must be carried out in an active and significant context of learning, and must aim at supporting and improving learning as well as teaching.

In a documentary review dealing with the contribution of ICT to learning, Bracewell and al., 1996, conclude that "the obtained results, which were not totally conclusive, have moderated the initial expectations [...] and lead to what might be called the perspective of the computer tool. Following this, technology is viewed as an important means to renew and improve the act of teaching. "

Many other studies also show that the use of ICT in learning promotes these changes (BRACEWELL and al., 1996). American schools which have succeeded in the integration of ICT have adopted this perspective (GLENNAN and MELMED, 1996).

A study conducted by KARSENTI, RABY and VILLENEUVE (2008) reveals that a majority of future teachers use ICT to plan and prepare their activities of teaching-learning.

RABY has developed a theoretical model of the process of ICT integration that proposes to describe and analyze the different stages of progress that teachers went through during their practice or their training, from not using to effectively using ICT. Her model defines four stages depicting the evolution of a teacher in his/her use of ICT in teaching: the phase of awareness (Stage 1) is based on a single sub-stage

which is the indirect contact; the phases of the personal use (Stage 2) and professional use (Stage 3) are based on two sub-stages: "Motivation and exploration-appropriation" (RABY, 2013).

The phase relative to pedagogical use (Stage 4) counts five sub-stages: "Motivation, familiarization, exploration, infusion and appropriation". This model reflects the interdependence and complementarity between the different stages of use of ICT by the teacher. Accordingly, the process of integration of ICT is not linear, in the sense that it remains possible to reorder or superpose the different stages.

Among the five factors influencing the implementation of technologies identified by FABRY and HIGGS (1997), three of them have a human dimension: resistance to change, the attitude of teachers and the professional development. The professional development appears here as a key element since an appropriate program would influence both the resistance to change and attitudes.

2- THE FACTORS THAT INFLUENCE ICT INTEGRATION IN TEACHING

The future of ICT in terms of educational uses will depend on several factors, including: awareness, motivation, attitude, time, perception, change, cognitive behavior, and innovation.

2.1- Awareness

According to Rogers (2000), five characteristics would predict the speed and easiness with which ICT will be integrated in schools. From these characteristics would emerge strategies of awareness that highlight the benefits of adopting ICT.

2.2- Motivation

The concept of motivation was the subject of several studies and researches: Dweck and Elliot (1983), Laferriere (1997), Parkerson, Schiller, Lomax and Walberg (1984), Deci, Kasser and Ryan (1996), Overton (1984); Weiner (1992).According to (Vallerand and Senecal, 1993; Pintrich and Schunk, 1996; Karsenti, 1998), motivation may be defined as "a hypothetical construct representing physiological and psychological processes. It is also the "tensor" of forces of internal and

external origins (situational, contextual and global), directed or not by a goal, which influence an individual on the cognitive, emotional or behavioral levels. Motivation is also a dynamic process which can impact the start, direction, intensity, persistence and frequency of behaviors or attitudes".

Maehr (1984) has pointed out that motivation in school is an investment by both the student and the teacher which refers to the internal and external environment of society; this investment is reflected by their will and the acquired forces in respect of their studies.

Motivation is a key factor of learning, it takes the lead. It seems that motivation is (presently) one of the best springboards of success (Dweck and Elliot, 1983).

Motivation is a central construct in the theories of learning. Although there are many other factors that lead to success, it seems to be, as a matter of fact, one of its best springboards (DwecK&Elliot1983), or even the key factor (Laferriere1997).

The motivational aspects of learning supported by ICT are relatively well documented, although sometimes contradictory (Warschauer, 1996). Studies show that the positive impact that the use of ICT has on motivation lies on four elements: the fact of working with a new medium (Karsenti, 1999), the nature of teaching becoming more individualized by ICT (RELAN 1992), possibilities of greater autonomy for the learner (VIENS and Amelineau, 1997; Karsenti, Savoie-ZajC and Larose, 2001) and, eventually, the possibility of a frequent and fast feed-back (Wu, 1992; Karsenti, Fortin, Larose and Clement, 2002).

2.3- Attitude

The word attitude (from the Latin Aptus) is defined within the framework of social psychology as being a subjective or mental preparation to action. It defines the apparent and observable behaviors as well as human convictions. Attitudes determine what each individual will see, hear, think and do. They emanate from experience and do not automatically become conducts of routine.

Attitude refers to the dominant individual tendency to react favorably or unfavorably to an object or an idea (a person or group of persons, institutions or events).

Attitude is considered as a perception, a commitment that we have regarding something, a judgment that we make about an idea or a person and even the way we distinguish things, a deep reason which leads the teacher to act according to the prevailing situation. That being said, the action of integrating ICT in his/her pedagogical task must be studied and worked out.

2.4- Perception

According to Onimus (1971), innovation is defined as any attempt that aims consciously and deliberately at introducing in the teaching system a change as to improve this system. Ducros and Finkelsztein, (1986), argue that the teacher plays a central role in transforming education and improving it, at the school level. It is therefore important to consider their working conditions, concerns and questionings as determinants of change.

2.5- Change

"An efficient use of educational technologies creates a systemic change, i.e. a change in the culture of the school or the university. ICT urge learners on to do things differently, and push teachers to modify their methods and teaching strategies. They lead the school community to adapt its goals, its values and beliefs in accordance with teaching and learning so as to suit best the new culture" (Maurer and Davidson, 1998)

Any innovation involves a change on the part of the targeted actors Savoie-Zajc (1993). Chin, 1976 defines the change as "the process by which a modification, a profound alteration and sustainable development occurs in a specific system.» . Different "units of change" can thus be affected. Chin (1976) identifies five levels of change, ranging from simple to more complex: change by substitution, change by alteration, change by disturbance and variation, change by restructuring and change in values.

2.6- Cognitive Behavior

According to Bracewell, Breuleux and Laferrière (1996), "New technologies have the power to stimulate the development of intellectual skills such as the ability to reason, to solve problems and to learn how to learn and to create. Technologies improve attitude and confidence, in particular among students at risk. They provide opportunities for learning that cannot be created otherwise. Let's consider for instance video projects, musical creations, manipulation of virtual objects, collaborative remote work …etc".

They add that the use of ICT has positive impacts on the development of intellectual skills (including the writing skill) and the spirit of research in learners, as well as on their motivation and concentration. It also fosters collaboration between teachers besides modifying their beliefs and their teaching practices.

Baron and Giannoula, 2002, on their part, assert that, computers are able to propose visual activities that have an interesting content according to the level of the learner, and to provide immediate and relevant feedback; they would be like an incentive object, a partner with which the young person can build psychological relationships. Lafortune and Deaudelin, 2002, added that the learner must be aware of the metacognitive strategies. Metacognition can be defined as "the awareness of one's mental approach in a perspective of action in order to plan, adjust, check and evaluate one's process of learning"

Perriault, 2002, ensures that, "The greatest benefit of ICT at this level of education is that they have the power to release the spirit, the thought of the learners". Depover, Karsenti and Komi, 2007 are of the same opinion and think that "the learner must put into practice the new knowledge. The result of a personal development which is no longer processed only in the brain of the individual, but also through the social interactions and the cognitive tools which will serve as a mediator between the individual and his environment"

Viau (2009) on his part thinks that" the learner must be committed cognitively when dealing with the information. Cognitive commitment can lead to perseverance if the student attaches importance to the proposed work, if he feels able to do so and if he can have control over

the procedure and consequences of the activity. This cognitive commitment will be achieved if the student is given access to the information to be processed, time to do it and a method of management of the information. This perception of the importance of the suggested work is further stimulated if the tasks proposed are close to the reality of the sociocultural environment of the student. "

2.7- Innovation

Innovation is reflected by the improvement of certain actions and processes. Basically, it is driven by a desire of progress. Innovation is a process that leads the teacher to live the difficulties and discoveries and to avoid uncertainty, failure and doubt.

As regards the notion of innovation in education F. Cros in 1996, asserts that "innovation in training and education is a desired social adventure, sought for, involving the desires of improvement by its actors-actors in quick and slow motions, transforming the regular and repetitive habits or ordinary actions. Innovation follows a cycle of life; it absorbs energy, and institutionalizing it, reintegrates it in the habitual time".

Innovation refers to the concepts of change and improvement of the usual practices. Innovation is a desired action. "The concept of innovation puts motivation in motion. We do not innovate without personal motivation, without intention, without a project of action. In other words, innovation is not decreed. Innovation is a momentum that can as well be the result of a desire to change than a need to respond to a difficulty". Marsollier (2019).

Innovation has revolutionized the practice of teaching; it has transformed its habits; the main actor in innovation: the teacher must adopt a new conception of work, and bury classical practices.

"Innovation is also perceived as a process of complex and dynamic change that needs time. It is a process aimed at introducing, willingly, a new practice in a school in view of a better efficiency to respond to a problem encountered in the environment or for a more efficient use of resources" (Guarant, 1999). "This social, active, contextualized and essentially reflexive process is achieved through the description,

analysis and formalization of practices. Analysis allows to live the transition and build a temporary stability" (Charlier, Bonamy and Saunders, 2002).

"On the whole, innovation is a change which, in order to improve a situation, can focus on a practice, a method, a way to teach some disciplinary procedure, a contents, a tool or new clientele" (Peraya, 2004). This improvement can concern a product, a company, a service, a process, a system, to allow achieving new goals. Innovation in teaching allows learners to have a better training, an education of quality; pedagogy, use of ICT, educational support, actions of communications.

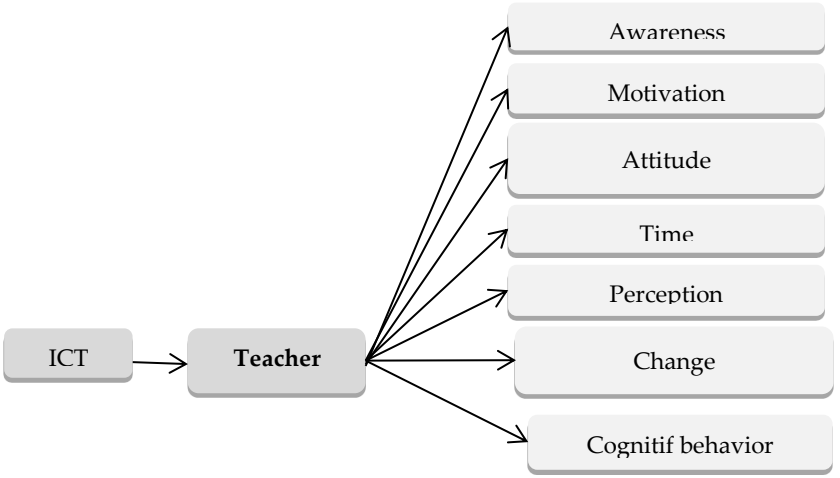
2.8- Time

Countries which are still at the early stages of the introduction of ICT in education need time to become familiar with this phenomenon. For teachers, the reasons and ways to use ICT in class depend on the accessibility of the equipment and the skills and knowledge of teachers. The relationship teacher/student has to be beneficial to achieve the objectives wanted. Studies of Colette Desgent and Céline Forcier (2004), Jacques Tardif (1992) and Jean Désilets (2001), conclude that ICT bring a goodwill to our work as teachers by allowing us to maximize the training time, keeping the students active and promoting memory retention, while optimizing the time devoted to learning.

3- THEORITICAL MODEL

A conceptual model allows explaining the different views as for ICT integration in teaching. We have carried out an adaptation of the model with several researches.

Figure 1. Conceptual Model



Source: Elaborate by the author

3.1- Methodology

3.1.1. Sample

Our study has been conducted on a sample constituted of 700 teachers (permanent, temporay and partners) belonging to different fields and faculties of the University of Tlemcen.

3.1.2. The questionnaire

The questionnaire that we have used is composed of two parts. The first covers nominal variables (signalitics); the second comprises 85 items measuring the seven (07) variables of research. Data were collected through self-administred questionnaires.

3.1.3- Reliability and exploratory analysis

Exploratory analyses were carried out on the overall scales that were used under the softwares IBM SPSS22 and STATISTICA.

Given the large number of variables to be studied, we have opted for a multidimentional methodology of analysis which aims at reducing the number of variables to a limited number of factors in such a way that each factor regroups the maximum of the available information. The chosen multidimentional methodology is the factorial

method of analysis or "ACP", which allows the existing relationships between variables and individuals; This choice was motivated by the nature of the variables to be analysed which are ordinal qualitative.

We have summarized all the indices in the following table:

Table 1 : Summary of reliability indices

	University		
Items	**Alpha of Cronbach**	**KMO**	**Bartlett's test**
Awareness	-,0620	,708	,000
Motivation	,099	,556	,000
Attitude	,088	,576	,000
Time	,095	,508	,000
Perception	,084	,546	,001
Change	-,096	,547	,000
Cognitif behavior	080	,517	,001

Source: Our results using the software Statistica.12 (N=700)

We wanted through this questionnaire to collect information about the various factors relating to the integration of ICT in education (awareness, motivation, attitude, change, time, perception, behavior).

The calculation of the Cronbach alpha coefficient is based on the study of the covariances between items composing the same test. As noted by Laveault(1993) "The more the covariances between all of the items taken in pairs are high, the more the items are homogeneous and measure the same thing". We have calculated this coefficient using the software of statistics S.P.S.S. and we have obtained good results. The Cronbach coefficient guarantees the reliability (internal consistency) of a test.

The Cronbach coefficient has served as an estimator of internal consistency. For each scale, the obtained coefficient has remained within acceptable standards for an exploratory research (>0.6)

In the same way, there is a statistically acceptable factorial solution that represents the relationships between the variables.

Bartlett's test of sphericity is always significant.

3.1.4. Test of the model

Any tested model of analysis is divided into two parts : the measurement model and the structural model. The first one determines

the indicators (observed variables) of each latent variable. Each indicator is defined either theoretically by the designer of the model of analysis or by using the factorial structure of the scale that appears after that an exploratory factorial analysis of ACP type was carried out. The second one concerns hypotheses of linear relationships between the latent variables and corresponds to the relationships defined a priori by the designer of the model of analysis.

The results were obtained using the software STATISTICA.

Each of these models must be translated into equations whose general form is:

Measuring model : $V_i=\lambda_i *F_a +E_i$

Structural model : $F_a = \beta_{ab}*F_b+\beta_{ac}*F_c+\ldots+\beta_{ap} *F_p +D_a$

With :

V_i : Observed variable i (indicator)

F_a : Latent variable A (construct, factor)

E_i : Error of measurement of i

D_a : Disturbance of A (error of measurement of the latent variable)

λ_i : Factorial contribution to estimate i on the latent variabale A

Table 2. Equations of the Model

Equations of the measuring model	
$Awar_1=\lambda_1 awar+E_1$ $Awar_1=0.877awar+0,772$ $Awar_2= \lambda_2 awar+E_2$ $Awar_2=0,790awar+0,894$ $Awar_4= \lambda_3 awar+E_3$ $Awar_4= 0,776 awar+0,679$ $Awar_5= \lambda_4 awar+E_4$ $Awar_5= 0,700 awar+0,681$	**Awareness**
$Mot_2= \lambda_5 mot+E_5$ $Mot_2= 0,889mot+0,648$ $Mot_5= \lambda_6 mot+E_6$ $Mot5=0,554mot+0,614$ $Mot_6= \lambda_7 mot+E_7$ $Mot_6= 0,640 mot+0,828$ $Mot_9= \lambda_8 mot+E_8$ $Mot_9= 0,812mot+0,718$	**Motivation**
$Att_2= \lambda_9 att+E_9$ $Att_2= 0,569att+0,551$	**Attitude**

$Att_3 = \lambda_{10} att + E_{11}$ $Att_3 = 0{,}798 att + 0{,}754$ $Att_4 = \lambda_{11} att + E_{12}$ $Att_4 = 0{,}591 att + 0{,}593$ $Att_5 = \lambda_{12} att + E_{13}$ $Att_5 = 0{,}640 att + 0{,}887$ $Att_6 = \lambda_{13} att + E_{14}$ $Att_6 = 0{,}801 att + 0{,}585$ $Att_6 = \lambda_{14} att + E_{15}$ $Att_6 = 0{,}510 att + 0{,}748$	
$Time_4 = \lambda_{15} temp + E_{16}$ $Time_4 = 0{,}510 temp + 0.521$ $Time_5 = \lambda_{16}$ time $+ E_{17}$ $Time_5 = 0{,}602$ time $+ 0{,}615$	**Time**
$Per_1 = \lambda_{17} per + E_{18}$ $Per_1 = 0{,}886 per + 0{,}768$ $Per_5 = \lambda_{18} per + E_{19}$ $Per_5 = 0{,}530 per + 0{,}869$ $Per_{10} = \lambda_{19} per + E_{21}$ $Per_{10} = 0{,}630 per + 0{,}651$ $Per_{11} = \lambda_{20} per + E_{22}$ $Per_{11} = 0{,}741 per + 0{,}754$ $Per_{12} = \lambda_{21} per + E_{23}$ $Per_{12} = 0{,}883 per + 0{,}793$	**Perception**
$Chang_2 = \lambda_{22} chang + E_{24}$ $Chang_2 = 0{,}500 chang + 0{,}887$	**Change**
$Beha_2 = \lambda_{23} Beha + E_{25}$ Beha $_2$= 0.587 Beha +0,685 Beha $_3 = \lambda_{24}$ Beha $+ E_{26}$ Beha $_3$= 0.772 Beha +0,848 Beha $_8 = \lambda_{25}$ Beha $+ E_{27}$ Beha $_8$= 0.698 Beha +0,721	**Behavior**

Source: Our results using the software Statistica.12 (N=700)

The results are satisfactory, the parameters of T student and the level of probability confirm the results obtained.

Each variable is accepted given the positive effect on the model. Each variable keeps the items specific to it.

Chi2 =1831,040;Degree of Freedom (DOF)= 1176,000;level of probability (p)=0.000

- Chi-square Index /dof=1831,040/1176,000=1.55, the result is acceptable.

The level of Chi-square is significant with a level of probability lower than 1%. The importance of the sample's size that could bias this test reinforces the quality of the result. The probability that the theoretical model adjusts properly to the empirical data seems high.

The GFI is on the order of 0,932; this result, close to the level of 1.0, strengthens the previous analysis. The same for the index AGFI =0.926. These indices measure the relative share of the variance-covariance explained by the model (GFI), adjusted by the number of variables with regard to the number of degrees of freedom (AGFI) after Jôreskog and Sôrbom, 1984.

Presentation of the absolute Fit indices in the central column. Their levels are presented in the left and right columns according to a confidence interval of 90%; there is a probability of 5% that the index be smaller than the lower terminal and 5% that it be larger than the upper terminal

Bentler and Bonett's Normed Fit Index (NFI) represents the proportion of the total covariance between the variables explained by the tested model. Its value is under-estimated when the sample size is small. This value 0.821 is very significant because it tends to 1.

Same interpretation for the NNFI (non-normed fit 0.720), it compares the lack of fit of the tested model with that of the initial model. Its value is used to estimate the relative improvement, by degree of freedom. This index is not recommended for small samples.

The IFI Index is good (0.645) close to 0.9, it can be applied for small samples.

The comparative Fit Index of Bentler (CFI =0.736) measures the relative decrease in the lack of Fit, the result is also good as it is close to (0.9).

Table 3. Equations of the structural model

Equations of structural model	
*Mot=$\beta_1$sens+E_1+ $\beta_2$att+ E_2 *Mot=0.616awar+0.103+0.801att+0.081	**Motivation**
*Per= $\beta_3$mot+E_3 *Per= 0.647mot+0.189	**Perception**
*Beha= $\beta_4$att+ E_4+ $\beta_5$per+ E_5+ β6mot+ E_6	**Behavior**

*Beha=0.772att+ 0.067+0.678per+ 0.165+ 0.747mot+ 0.075	
*Chang= $\beta_9$sens+ β_{10}mot+ β_{11}per+ β_{12}att+ β_{13}beha + β_{15}time	
*Chang= 0.630awar+ 0.714mot+ 0.724per+ 0.775att+ 0.789beha+ 0.889time	**Change**

Source: Our results using the software Statistica.12 (N=700)

3.1.5. Results of the test

- The first relationship is intended to show the effect of motivation on awareness and attitude

  Mot=0.616 awar +0.203+0.80 att+0.081

  When analyzing the results we notice that perception impacts on motivation:

  Per = 0.647+0.189 mot

- Test of behavior on attitude and motivation ; we notice that the behavior of teachers influences directly perception and motivation:

  Beh =0.772att+ 0.067+0.678per+ 0.165+ 0.747mot+ 0.075

- Test of influence of change on the overall variables;
- Chang= 0.630 awar+ 0.714 mot+ 0.724 per+ 0.775 att+ 0.789 beh+ 0.889 time

We notice that the impact of change is positive on the tested variables

The results show that the variables influence significantly on ICT integration in education.

We wanted, through this questionnaire, to obtain information about the various factors relating to ICT integration in education (awareness, motivation, attitude, change, time, perception, behavior).

As per the model of the study, seven variables have a direct impact on change, i.e. on ICT integration in education. As far as this research is concerned, we have focused our investigation on the identification of some determinants, namely: attitude, perception, motivation, awareness, behavior, and time relating to teachers in their ability to control a teaching integrating ICT.

Each of these variables has characteristics which will intervene in ICTE integration and in pedagogical change. In fact, teachers in higher

education are sensitized and motivated to change. Teachers' perception vis-a-vis change is also important, with a fairly high percentage, attitude and behavior of teachers are also significant. Time and the image of the institution represent a good result, since, owing to the changes, we can get good results in class without losing time. According to Mangenotoo, ICT integration suggests time efficiency. This efficiency presupposes a gain in terms of the learning time, equipment installation, motivation and a better appropriation.

Accordingly, the stronger attitude is, more it produces a behavior consistent with it. Behavior production depends on the strength of attitude. Attitude must have a sufficiently stable and strong structure so that behavior be consistent with it (Krosnick, Boninger, Chuang, Berent&Carnot, 1993). ArmitagE&Conner, 2001; Godin&Kok, 1996; RAndall&Wolff, 1994; Sheppard et al., 1988; Sheeran, 2002, have shown strong correlations between attitude and behavior; this correlation allows us to obtain some results. In our case, this correlation is important since it presents to us the good image of the school, and here, the school is replaced by faculty and department.

Viau (1994) puts forth in his model that motivation is influenced by perception. The way a teaching using ICT is seen by the teacher has an impact on his motivation and, consequently, its performance.

According to the study of Lambert, attitude determines the motivation of a person who contributes afterwards to obtain good results, which is the case of our study. Attitude is behind 80% of teachers that are motivated.

According to Lambert (1974), Attitudes develop under the influence of the environment or the social environment of the learner, then do or don't promote the learning process. The term "social environment" includes the values, beliefs and expectations of the society with regard to ICT integration in education.

According to Carroll (1981) perception influences motivation. This theory confirms our result with a significant rate on the order of 65%.

Therefore, teachers in higher education are enthusiastic vis-à-vis ICT integration.

CONCLUSION

The findings of several researches shed light on several points: ICT integration requires a continuous and regular use; the use of ICT must be carried out in an environment that promotes learning; ICT integration must have a dual purpose, improving both teaching and learning.

The main goal of the classical school was to transmit knowledge via a teacher . At the present time, the principle has changed: knowledge is also transmitted by ICT. The educational act is transformed through the use of these instruments. In this digital era, the school, knowledge as well as learning have changed, because pupils and students do not have the same cultural vision, nor the same attitudes and interests. We have to take into account these changes given the many contributions of ICT to the educational system.

Today, it appears essential and fundamental to us to endeavour to anticipate and understand the effects led by these changes for the good of the educational system. ICT integration offers therefore advantages to be introduced where they can be beneficial for economic development.

ICT integration is not only an introduction, for it is not a mere matter of introducing computers in schools without making a change in pedagogical practices.

The issue here is mainly the appropriation of technologies to change or improve educational practices.

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