

# The Political Integration of ICT in Higher Education: Evidence Case Study with Structural Equation Modelling

Dr.Redouan Ainous<sup>1</sup> Dr. M'hammed BENDINE<sup>2</sup> Dr. Yamina GRARY<sup>3</sup>

## Abstract

This research work focuses on the integration of information technologies and communication in higher education. The objective is to analyse the action against the university teachers and their teaching practices outside the classroom. Though, a survey of 603 teachers in higher education from the University of Tlemcen. She allows you to test the factors that influence over the teachers in their teaching practices. These include the factors examined in this research (behaviour, attitudes, motivations, awareness and perceptions). However, the qualities of representations of these dimensions are right as well as the reliability of the whole of the dimensions. The analyses of the consistency and the validity give satisfactory results. An analysis relationship between the variables and the model is performed.

**Keywords:** Integration of ICT, Technological innovation higher education Pedagogy.

## Introduction

Algeria has invested a great deal in the field of education. The sector of national education and higher education play a leading role in society, regarding knowledge and transmission of knowledge. The Algerian universities are not remaining isolated from the world. She has developed many agreements and cooperation with a vast number of universities and the research centre in the world. These agreements allow you to keep a permanent contact with researchers around the world.

The arrival of ICTS in the middle of, the education is a significant event in the measure where they come to improve the quality of teaching. Now, the ICT, innovative tools are putting to open up to the globalisation, ICTS globalisation has made the Universe a global village. The information flows easily and instantly. Our country's attempts as to clinging the rhythm of the globalisation do not stay in the margin of the scientific and technological developments, at the risk of finding themselves in a bottleneck. ICTS offer new opportunities for the acquisition of knowledge. It is necessary to know how to enter for a better dissemination of educational resources. ‘

Our study will resume the problematic of the subsequent research in the illustrating by empirical research that our theoretical reflections:

***How can ICT contribute to the quality of education?***

## Literature review

### The higher education:

‘The Algerian University is a national institution created and financed and controlled by the state authorities. Located at the top of the Pyramid of educational institutions, the University is intended to play a dual function: to provide the knowledge and the produce and develop research.’

The Algeria must meet the challenge to the TICS in higher education. ‘The Algerian University modern must enrol in the world which has chosen to make the new technologies an important engine of its activity to increase its efficiency and productivity. The educational system is currently in the process to reconfigure itself.’

The ICTS are at the heart of a willingness to reform of the lessons, rationalisation of the dissemination of knowledge and an improved education quality in Algeria.

Let us take the example of the AUF who participates in its program of support of ICTS to the development of tertiary education, research to include Algeria in the Information Society. Higher education offers students a quality learning on the campus and online.

‘The Algerian universities are still weakly present on the Internet and the networks of sharing and exchange. This absence is the bearer a risk of magnetisation particular in the international level. To this effect, the university has to meet this challenge to numeric networks and knowledge. This digital revolution requires the institutions of education respond to better expectations of the current generation, a native of the numerical by offering him a learning adapted to this modern gives.’

### Integration political of ICT in education:

Since a few years, the technologies of information and communication technologies (ICT) took the place of more

<sup>1</sup> Professor of Economics, University of Algiers<sup>3</sup> – Algeria, and a membre in MECAS Laboratory :

<sup>2</sup> Professor of Economics, University of Adrar – Algeria, and Director of the Algerian-African Economic Integration Laboratory.

<sup>3</sup> Professor of Economics, University of Tlemcen – Algeria, and a membre in MECAS Laboratory

important in education, in particular, that of the superior. This use of modern means the communication for teaching is part of a wealthy and varied history that has crossed all the time since the end of the 19th century (Alberto, 2004; Russell, 2001).

Before launching the project on the training of teachers With the ICT, Algeria is invested in a large project that of conquering the world academic by the Internet network, what is called the project ARN (Academic Research Network). Its mission and to penetrate the Internet at all the university sector so that teachers can share information so that the students can exchange documents between them. The draft TV teaching has been included in the project RNA, even the project of the digital library. The educational sector is without a doubt the sector most gourmands in the field of ICT. The information society is before all to access the information whatever it is and where it is.

Regardless of the recent system of education focuses on the integration of ICT, where the use of ICT in education changes the practices, methods and content of education as the evaluation process. Of this fact, ICT must become useful tools and be an integral part of the educational process, must encourage the creative development of students and their digital skills.

‘In effect, since a few years already and at a speed of more and more meteoric. The university education is evolving in context of a mutation of the report to the knowledge and between walk-in the universe of electronic information, the Internet and the “e-learning” (Karsenti and LAROSE, 2001)

“According to several, teaching with or by the Technologies is the most productive sector and popular on the market of education and the University Teaching (Schutte, 1999). Brown (1996) indicates that the most meaningful change in education is the phenomenal growth of the Internet and in particular. The graphical version of the Internet commonly called the Web that has changed into a sustainable manner our modes of communication but especially the context of education. In the space of only a few years, the Internet and the Web have become, for several reasons, of the elements of the daily quasi-inevitable (Karsenti and Larose, 2001).

ICTS are transforming the education practices of teaching. It is converging with education toward a potentially valuable and remotely.

The ICTS are trying to impose on the educational system; the latter exerts a particular pressure to that the tool creates the need. If powerful, they may be, if user-friendly, but remain involved in the educational field. Nevertheless, by the skills and the spirit criticism of teachers will ensure optimal use and beneficial technologies in education. Grace to ICTS, teachers, will be able to draw from several sources; they make the presentations of the lessons more attractive in class.

‘These new attitudes will contribute to making the teachers aware that they are not the most sources of knowledge in the face of the students. In fact, teachers are no longer the unique source of information; they are just the one source of knowledge and will work together better as facilitators of learning, guides, proactive agents of change and as players’ learner without interruption during the entire life. This will have as a result of significantly modify their design of the teaching-learning process as the report on the knowledge and relationships with their students.’

This leads learners to change their attitude to learning, they are more motivated, and the student teachers may be placed in situations of practical learning varied and multiple. In this sense, the programming plays an essential role. ‘On the educational plan, teachers need new educational skills, allowing them to take advantage of the Potential for ICTS to improve the programming. Concerning the pedagogical integration of ICTS, teachers need strategies to integrating significantly.’

**Case Study:** Tlemcen University

Our sample consists of 603 teachers of higher education divided as follows:

**Table No. 3: Number of teachers questioned at the level of the faculty of the University of Tlemcen**

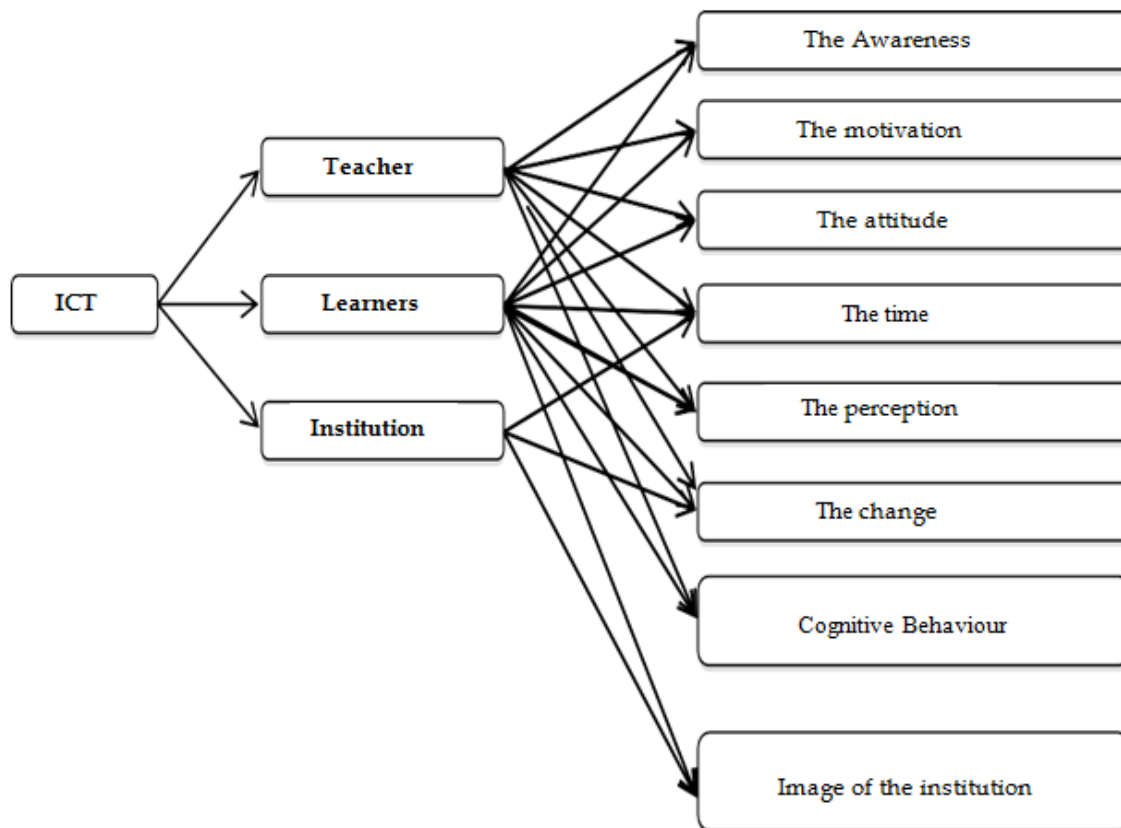
Faculty of the engineering sciences	Faculty to right	Faculty SEGC	Faculty of Medicine	Faculty letters & lty of Human Sciences	Faculty of Science
278	45	67	98	78	37

**Source:** Guide to the University of Tlemcen 2014-2015

However, the purpose of this research is not to administer a test external to a full sample to the whole of the teachers. Our goal is essential to examine the place of ICT to the breasts of universities, if they are relations between learning strategies reported by teachers and their performance at school, also if the level of study will improve or not.

This work is based on the version 20.0, base SPSS, in the French version and on the version 12.0 Basis of STATISTICA in English version.

We have adapted the model to several kinds of research:



**Fig.1:** The theoretical model  
**Source:** Elaborated by authors

Overall, the university teachers, the kind man dominates that of women with a rate of 58%. The age of respondents varies from 30 to 40 years. However, 81.6% of teachers have an experience that does not exceed the 10 years of seniority. 81.6% of the surveyed are relatively young since they end up early when studies and quickly recruited. 22.1% of the teachers are private contractors whom we come; other faculties and other nearby universities see different contractors even who are not yet permanent are associated. This fact that the university appeals to persons who work in private companies or state actors such as the bank and insurance share their knowledge to the learners in such a way as to enrich the university with the knowledge and do enter the student indirectly in the world of practice. It is a critical initiative and exciting for the image of higher education.

The results confirm the positive role that ICT can play in the framework of the design of the learning and teaching. Since all of the teachers questioned to use this tool for the preparation of the course and this including, the purpose of the strengthening and the enrichment courses and solve the problem of development time.

To assess the level of the implementation of ICT in the class by teachers, it must start from the principle of training, while knowing that only the teachers that have done some training in the use of ICT control well this educational tool. The teachers' attitude exchanges with the function of the learners, we note that the students are interested in this instrument since the latter knows to manipulate a keyboard and a mouse without going through training.

The time that the students are interested in ICT, the teacher will not find difficulty using this tool as a pedagogical tool in progress. However, which fact, afraid the teacher, the factor of research is not yet to assign to students because of the language of study that presents itself as a handicap for the students overlooked the search.

### Result and discussion:

Several successive PCA has carried out on the global scale and the scale of each variable. A satisfactory solution was obtained on 8 variables and 85 Items. The alpha Cronbach as that the KMO and Bartlett's test is significant.

University			
Items	Cronbach's alpha	KMO	Tests of Bartlett
Awareness	,596	,708	.000
Motivation	,074	,490	.000
Attitude	,088	,576	.000
Time	,082	,498	.000
Perception	,074	,492	.001
Change	082	,498	.000
Cognitive behaviour	080	,478	.001
Results	,088	,519	.000

Source: Statistica Software V.12 (N=603)

'The methods of structural equations differ from other methods of data analysis, they use the data matrix of departure is the matrix of variance/covariance that is that of the correlations between the variables, but never that of the raw data. In these methods in effect, attention does not depend fundamentally on the individual observations, but on the networks of relationships between the variables. Initially, the structural equations model have designed to analyse the covariance structures between variables at the point of the styling very long "methods of analysis of the covariance structures". The choice to interpret a matrix of correlations is appropriate when it comes to comparing the coefficients directly to the inside of a model. The correlation matrix is in some way a variance- covariance matrix standardised' in which the variances – covariance is divided by the product of the standard deviations. In this case, the coefficients obtained to vary from -1 to +1 and are independent of the unit of measurement (Dillon, Kumar and Mulani 1987).

**A. The adjustment indices absolute:**

The adjustment indices allow absolutely to assess what extent the a priori model reproduced the collected data correctly. The value of the Chi-square is linked to the size of the sample of after Satorra and Bentler, 1988.

Presentation of the whole of the indices of adjustments of structural equations calculated by the software STATISTICA:

**Table No. 5:** indices of absolute adjustments

The indices	The
Chi	1817,49
Degree of Freedom	1128,00
Level P	0.000
Ctmr Standardized Residues	0.051
(GFI). Joreskog	0.894
(AGFI). Joreskog	0.885
(BIC). Bayesian criterion of	0.557
Chi of the model of independence	3072,71
(DL). Model of Indépend	1176,00
Param.not centralised in the pop.	0.084
RMSEA index Steiger-Lind	0.047
Non-index central. McDonald.	0.902
Gamma index Population	0.967
Gamma Index Adjusted Population	0.964

Source: Statistica Software V.12 (N=603)

**B. Analysis of the adjustment measures absolute:**

Chi2 =1817.498; degree of freedom (DDL) = 1128.000; level of probability (p) = 0.000

-Index of K-square/ddl=1817.040/1128,000 = 1,611 the result is acceptable.

'The level of K-square is significant to a lower level of probability to 1%. The importance the size of the sample that could be detrimental to this test reinforces the quality of the result. The probability that the theoretical model adjusts appropriately to empirical data, therefore, seems high.

**Table No. 6:** The absolute indices

The Indices	Lim. conf. Inf. 90%	Point estimate	Lim. conf. Sup. 90%
Param.not centralised in the pop. NBP	0.084	0.127	0.212
RMSEA index Steiger-Lind	0.047	0.054	0.062
Non-index central. McDonald. PNNI	0.843	0.898	0.902
Gamma index Population	0.953	0.960	0.967
Gamma Index Adjusted Population	0.948	0.956	0.964

Source: Statistica Software V.12 (N=603)

According to this table, the Gamma index adjusted represents a variance in the GFI and AGFI. They take account of the variance-covariance matrix induced on the total population and not on the sample (Tanaka, Huba, 1989).

The PNNI index, indices of no centrality are usually between 0 and 1 (McDonad, 1989) and for the NIBP (Steiger, Shapiro and BROWNE, 1985).

Concerning the RMSEA index (Steiger and LIND, 1980) represents the average difference, by degree of freedom, it has a confidence interval associated with 90%.

**A. The incremental indices:**

The differential index measuring the improvement of the adjustment by comparing the model tested in a base model:

**Table No. 7:** Main index of increment adjustment for the global model.

The indices	The values
(BSS). Adjust index. Standardised Bentler- Bonett	0.709
(NNFI). Adj Index. non standardized Bentler- Bonett	0.720
(CFI). Adjust. Compar. Bentler index	0.736
(RFI).Rho Bollen	0.783
(IFIS). Delta Bollen	0.645

Source: Statistica Software V.12 (N=603)

Index of Bentler and Bonnet of adjustment standardised (NFI), represents the proportion of the total covariance between the variables explained by the model tested. Its value is underestimated when the sample reduces in size. This value 0.821 is very significant because it tends toward 1.

Same interpretation for the NNFI (adjustment not standardised 0.720), it compares the lack fit of the model tested that the basic model. This value used to estimate the relative improvement, by the degree of freedom. This index is not recommended for small samples.

The Index IFIS is good (0.645) approximates to (0.9); it can apply to small samples.

Comparative adjustment index of Bentler (CFI =0.736), a measure of the relative decrease in the lack of adjustment, the result is also good as it is close to (0.9).

**D. The indices of parsimony:**

The indices of parsimonious are indices of adjustments absolute or incremental, modified to account for the parsimony of the model. These measures assess the parsimony of the model analysis in linking the quality of its adjustment to the number of parameters to estimate.

**Table No. 8:** Main indices of parsimony for the global model.

The indices	The values
(AIC). Criterion Akaike Information	0.347
(PNFI). Adjust index.Parcim.James-Mulaik-Brett	0.892

Source: Statistica Software V.12 (N=603)

The indices AIC (Akaike, 1987) and ECVI (Browne, Cudek, 1989) must take the lowest value. In this case, it keeps the AIC Index since it is lower than the index of (ECVI)

The Index PNFI (James, Mulaik and BRETT 1982) is the result of the adjustment of the NFI about the degree of freedom of the model tested. It has the same characteristics as the NFI. This result is good since its approach of 1.

**E. The meaning of the factorial contributions:**

‘The t-test must be greater than 1.96 at the level of significance of 5% for each contribution factorial indicators attached to a building to check the positive relationship between them. The table presents the estimates of the parameters indicates that each test t is significantly higher than 1.96 checking as well the significance of the link of each indicator to its built. The indicators do not confirm by this test have removed

the result of 'CFA'.

The reliability evaluation of the internal consistency in each built (rho deKsi) and their variance explained: The objective is to check that the indicators specified in the model represent well enough the established.

A good reliability of the measurement instruments requires that the index is greater than or equal to 0.70. If the indices are lower than 0.70, the tests of discriminant validity should be done to see if factors could not be grouped to provide a more reliable measure. The high correlations between the latent variables lead to make this suggestion:

The variance explained of constructed (rho of convergent validity) = sum of contributions factorials standardised squared / [Sum of factorial contributions high Standardised to the square + sum of errors of measurement of indicators].

#### F. The structural model:

$$F_a = \beta_{ab} * F_B + \beta_{ac} * F_c + \dots + \beta_{ap} * F_P + d_a$$

Fa: latent variable  
A (built, factor)

Da: disturbance of a (measurement error of the latent variable)

Bab: Regression coefficient to estimate indicating the strength of the influence of the latent variable P on the latent variable.

Depending on the model of the study, seven variables have a direct impact on the change, i.e. on the integration of ICT in education. For this research, we have focused our investigation on the identification of some determinants, namely the attitude, the perception, motivation, awareness, behaviour, the institution image and the teachers' time in their ability to control a teaching and integrating ICTS.

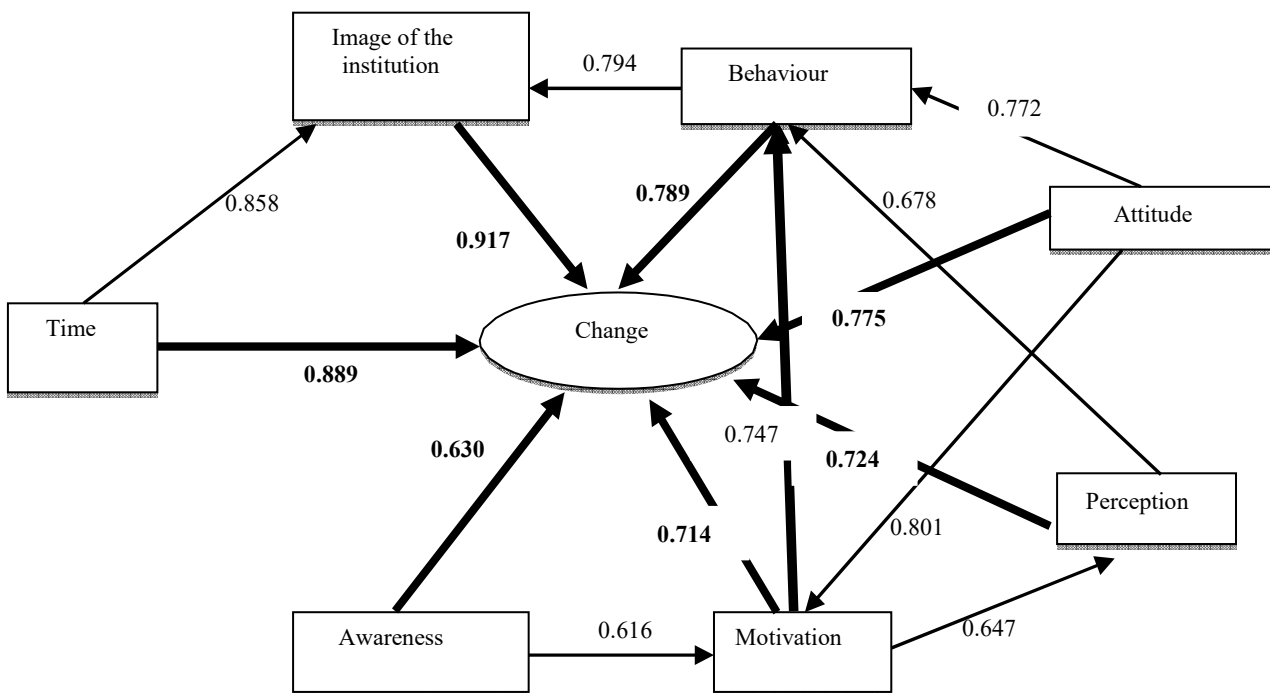
Inspired by several studies and theories tried to enumerate the different variables come into play to the integration of the CTBT citing as well the awareness, motivation, the perception, the attitude, the behaviour and the time and the image of the institution. Each of these variables has characteristics will intervene in the integration of the CTBT and the educational change. In effect, the teachers in higher education are aware and motivated to change. The perception of teachers overlooked the change and necessary, with a percentage of 72.4%, the attitude and the behaviour of teachers are significant. The time and the image of the institution represent a good result, since thanks to the changes we can get good results in class without losing time. According to Mangeno too, the integration of ICTS involves the efficiency of the time. This Effectiveness presupposes that they are gains regarding the learning time, installation of hardware, Ownership Best and motivation.

Of this fact, more the attitude is strong more it produces a behaviour consistent with this attitude; the production of a reaction depends on the salience of the attitude. The attitude must have a structure sufficiently stable and strong to be able to observe the realisation of the behaviour consistent with the latter (Krosnick, Boninger, Chuang, Brent & Carnot, 1993). Armitage & Conner, 2001; Godin & Kok, 1996; Randall & Wolff, 1994; Sheppard & Al., 1988; Sheeran, 2002, showed strong correlations between the attitude and the behaviour. This correlation allows us to obtain some results in our case this correlation is significant since it presents to us the good image of the institutions and in this part, it replaces establishment by faculty and department.

VIAU (1994) advance in its model that the motivation influenced by the perception, 64.7% represents this good influence. The way the teacher collects a teaching by the tics affects his motivation and, consequently, its performance.

According to the study of Lambert, the attitude determines the motivation of a person who contributes to the following good results, and it is the case of our study. The attitude determines 80% of the teachers motivated.

According to LAMBERT (1974), Attitudes develop one influence to one environment or the social environment of one learner and promote or not learning. The term 'social environment' brings together the values, beliefs and expectations in the Community respect the integration of ICT in education.



**Fig. n ° 2:** The global model of the variables that influence on Higher Education.

**Source:** Elaborated by authors

According to Carroll (1981), the perception influence on the motivation is this theory confirms our result with a significant rate of 65%.

Thus, the teachers in higher education are enthusiastic to as regards the integration of the CTBT.

**Conclusion:**

It must be said that, in general, teachers and students used the technologies in class consider useful. However, the teachers and the students do not always agree as for the effectiveness of different techniques types in the classroom.

More than half of the students have a positive appreciation, or positive use of ICTS in their school tasks and the vast majority of teachers have a positive appreciation or positive about ICTS in general, believe that ICTS facilitate. Their work and like to use them in a general way (and not only in their task of teaching).

From observations made among teachers, we can conclude that it's indeed a link between ICT and learning. In a more precise manner, we can say that the use of ICT for the course has an individual relationship (within the meaning of neither very loud nor very low) with the 'overall perception of the course by the students'.

It established first that, to some degree, more teachers are motivated to use ICT more they have the perception of having done a course effectively. Also, it established that ICTS are tools, means that may be employed in support of programming and that when the teachers believe that this support role is well to assume by the ICTS. They have a greater perception, best attitude and earns more time to present and prepare a course.

**References:**

[1] Altbach, P. (2015). Knowledge and education as international commodities. *International higher education*, (28).

[2] Baltodano, M. M. (2016). ICT Training Requirements in Higher Education: Case Study of Training Programme for the Didactical Use of Web 2.0 Applications. *Educational Excellence*, 2(1), 15-27.

[3] Bray, M., Adamson, B., & Mason, M. (Eds.). (2014). *Comparative education research: Approaches and methods* (Vol. 19). Springer

[4] Bridgstock, R., & Cunningham, S. (2016). Creative labour and graduate outcomes: implications for higher education and cultural policy. *International Journal of Cultural Policy*, 22(1), 10-26.

[5] Buabeng-Andoh, C. (2012). Factors influencing teachers' adoption and integration of information and communication technology into teaching: A review of the literature. *International Journal of Education and Development using Information and Communication Technology*, 8(1), 136.

[6] Cabero-Almenara, J., Marín-Díaz, V., & Sampedro-Requena, B. E. (2016). Meta-analysis of research in e-learning Spanish journal published. *International Journal of Educational Technology in Higher Education*, 13(1),

1-17.

[7] Conférence Mondiale sur l'enseignement supérieur, L'enseignement supérieur au XXIe siècle, UNESCO,

[8] Gikas, J., & Grant, M. M. (2013). Mobile computing devices in higher education: Student perspectives on learning with cellphones, smartphones & social media. *The Internet and Higher Education*, 19, 18-26.

[9] Guide sur l'université Aboubakr belkaid.Tlemcen2003-2004

[10] Gupta, M. (2016). Enhancing quality higher education through the successful implementation of ICT information and communication technologies in education with special reference to Rajasthan. 5-8