Educative uses of ICT, technological skills and academic performance of the Venezuelan university students (Barineses): A causal perspective

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ABSTRACT

The objective of this research was to analyze the relations among the educative uses of ICT, levels of skills in the technology handling (ICT Skills Index) and academic performance of the Barineses university students, in order to propose a model of causal relations that represents suitably, the effects of the technology use with academic aims on the results in the studies. It was a random, cross-sectional and anonymous study that follows the habitual evolution of the research process: it begins by being a descriptive research, and finishes as explanatory study. The sampling was by conglomerates and stratified groups, in three stages. The sample for the study consisted of 410 Barineses university students. A questionnaire applied by the students was used. The statistical analysis was carried out in two phases: descriptive univariado and with structural equations modelling. The proposed causal model during the research development, revealed significant influences of several indicators on the scores obtained in the ICT Skills Index; not occurring the same in relation to the influence of this last index on the Academic performance of the Barineses university students. This result seems to support, the often outstanding thing in literature on the subject, in relation to the difficulties found until now by the researchers, to demonstrate the effectiveness of the use of ICT on the results in the studies; and it again places in centre of the debate the well-known paradox of the non significance (see Russell, 1999, for a more detailed analysis of this phenomenon).

Keywords: *Educative uses of Internet; Internet and higher education; Internet in Venezuela; e-Literacy; Academic performance; Effectiveness of the use of ICT.*

INTRODUCTION

The formidable expansion of Internet in the last years seems to show itself of unequal way according to the social group which it is. Our Venezuela country is somewhat straggler, in relation to other countries, respect to degree of penetration of this technology with only 11.66% of the total population connected. However, it has experienced a fast growth in the last years that made elevate the number of users in 62% during the 2000, 40% in 2001 and 32% in 2002. This rate of growth fell appreciably to 0.14% during 2003, but it recovered his ascending tendency in 2004 with 26% of increase and during 2005 with 41% (Tendencias Digitales and Cavecom-e, 2005). In our context, like in many others, the pioneer social sector in the use of Internet has been the university community. Thanks to the impulse of the State by means of the creation and beginning of REACCIUN, the national academic network, fast and easy access to the universities of permanent form starting from 1994 was provided. Initially, this access was restricted to the educational personnel and researchers; nevertheless, gradually the universities have been extending the free connection to the students (especially in laboratories of computers with connection to the Network located in the university campuses).

It is not possible to be denied that in the last years many researches, congresses and workshop, mainly in the American and European universities, have been dedicated to the subject of the usages of the Information and Communication Technology (ICT) in education and learning.

Despite the previous thing, it is a well-known fact that in many of those researches, a little participation of the students in the stage of the projects design is demonstrated (for example, in those cases that imply elaboration of innovating learning materials). Basically, the participation of the students has been confined to inform to the promoters into such initiatives on its ideas and necessities related to the systems that will be implemented. In much counted occasions, the university students have been considered like principal actors in the processes of incorporation of ICT to the higher education institutions. Most of the times, the opinions of university authorities and teachers are only taken into account; in which we could identify like a top to bottom vertical perspective on the subject. The university students like passive individuals on those who will fall the direct influences of the implantation of these technologies, would have to know and to accept the developed models and practical proposals, like only way to obtain a successful incorporation of ICT to the University.

Nevertheless, it is opportune to indicate the existence of some other studies that have followed, indeed, the opposite approach - from bottom to top - trying to measure the students' points of view in relation to the present and potential roll of development of ICT in higher education. To this group they belong, in first term, an American initiative advanced by the Pew Internet & American Life Project (2002) titled "The Internet Goes to College: how students are living in the future with today's technology"; and also, two European projects: SEUSISS PROJECT (2003) and the SPOT PLUS (2003). They have served much as inspiration to generate the research theme of this study.

In the first place, the Pew Internet & American Life Project (2002) carried out a research where basically a profile of the American university students is made, like users of the network for academic and socialization aims of. The research advanced by this organization, had like primary objective to research on the impact of Internet in the daily life of the North American university students and to determine the repercussion of these usages on its academic and socialization routines of. Questionnaires to the students in a wide rank of higher education institutions were randomly distributed. The study was concentrated in the college students; that is to say, those that they look for to obtain a professional title and they dedicate to the majority or the totality of theirs time to that intention. The students reported a broad positive experience with Internet. A 79% of the American university students said that to use Internet it had a positive impact on his academic experience. Approximately half mentioned that the email allowed them to express the professor ideas that could not declare to him in class. Many students also reported that they used the Internet mainly to communicate socially with his friends. In the study the diverse implications of the student uses of Internet in the North American universities are discussed.

On the other hand, in SEUSISS PROJECT (2003) a research went ahead whose north was to evaluate the abilities shown by the students of seven European universities, in the handling of the Information and the Communication Technology. It was possible by means of the determination of an index of technology handling known as ICT Skills Index[1] considering that this is one of the capacities better appreciated in the society of beginnings of century XXI. The fundamental intention of the initiative was oriented to the determination of the technological abilities of the European university students, as much news students as those next ones to graduate. Basically, the objective of ICT Skills Index - according to the approach developed in that study - consists of measuring the levels of experience reported by an individual with a rank of applications software previously selected. One is which we could designate like a scale of 3 scores, concordant with the position of the student towards the following affirmations:

> *"I can make that type of tasks completely single"*
> *"It would need some aid to make that type of tasks"*
> *"Never in my life I have made that type of tasks"*

The applications software considered with the aim of the determination of the ICT Skills Index are the following ones: design Web, presentations manager, databases, graphical programs, spreadsheets, on line bibliographical databases, Web browsers, electronic mail, applications for Chat, and text processors. It consists, consequently, of a scale with a highest score of 10 (crossed of the variable of [0.10]). Although both very excellent work in their area, are limited to describe the habits of Internet usage in the American case, and to quantify the technological abilities of the students, in the European case.

Additionally, Wenglinsky (2003) carried out in the U.S.A. a research on great scale in which it values the impact of certain instructional practices - at level of the classroom - on the students reading understanding. Although it is certain that the work is referred to students of fourth degree of elementary school, for its methodology approach, it has individual interest for the accomplishment with the present investigation. The study relates the pedagogical practices of the teachers, as well as, the characteristics and baggage of knowledge of each one of them, with the student performance in a test on reading understanding; taking in consideration the characteristics from each student.

Kuh and Nelson (2004) analyzed the experiences of a great sample of American university students (more than 12,000) with the usages of the Information Technologies, from the point of view of their possible relation with some aspects of the student engagement[2]. The work extends our level of understanding on the relations between the educative uses of the ICT, and the degree in which the students to get involved in effective educative practices[3], that previous research have demonstrated has a positive incidence on the results in the studies. In first stage of the study it was persecuted to validate a scale that measured the student uses of the technology, besides to prove the sense and strength of his relation with other established indicators of student responsibility. The objective of the second stage of the work was to examine the convenience of changing the present perspective that sees the particular uses of the technology as a form of student engagement itself, by another vision, according to which the ICT would be only a component of other forms of study dedication.

Indeed, animated by the main findings of these four studies arose the challenge to analyze, in the first place: a) the habits of use of ICT for academic aims exhibited by the Barineses university students, b) to quantify the computational competences of these students and c) to try discover that aspects of the user profile - delineated in the literal "a" – cans determine a greater or smaller confidence in the technology use. Next, it used the structural equations modelling looking for discover possible relations of causality among practices of use of Internet in the studies, technological skills and academic performance of the students. Consequently, the objective of the present study was:

• To analyse the relations among the educative uses of the ICT, levels of skills in the technology handling (ICT Skills Index) and academic performance of the Barineses university students, in order to propose a model of causal relations that represents suitably, the effects of the technology use with educative aims on the results in the studies.

The proposed model suggests that educative usages of Internet have a direct influence on the academic performance and, an indirect effect, through degree of technological skill of the student.

METHODOLOGY

The present report is based on the results of a questionnaire, applied to university students of higher education institutions, public and privates, seated in the Barinas state (a province of the

centre-western region of Venezuela). The questionnaire was distributed randomly to a representative sample by conglomerates and stratified of a wide rank of universities, with the aid of Statistics students at the Experimental National University "Ezequiel Zamora" - UNELLEZ, in the month of September of 2004. The fact that the questionnaire was applied by university students its homologous ones, guaranteed that the participants in the study remained nameless, reducing to the minimum attitudes towards certain aspects of the Internet usage, that could be considered personal or particularly sensible. The questionnaire direct application also allowed arriving at the students, of a way that had been impossible by other means, like in a telephone interview. The survey was distributed to registered college students in different programs in six institutions of higher education with seat in the Barinas city. **Table 1** shows the conformation of the population in the present research:

Table 1: Population of university students registered at the Institutes of Higher Education Barinas state

The institution's name	Institution's Type	Number of students registered
National Experimental university of the Occidental Plains "Ezequiel Zamora" – UNELLEZ.	Public	10.900 [a]
University Polytechnic Institute "Santiago Mariño" - IUPSM	Private	2.000
Technological "Agustín Codazzi" – IUTAC	Private	6.000
Experimental Pedagogical University Libertador – UPEL	Public	1.000
Technological "Antonio José de Sucre" - IUTAJS	Private	2.500
Nacional Open University - UNA	Public	4.000
Total		26.400 [b]

[a] it doesn't include the Mission Sucre students

[b] it doesn't include the Bolivariana university students neither to the Santa María university students

On the other hand, we designed a stratified sample (public institutions, private institutions) with proportional distribution. **Table 2** summarizes the final conformation of the same one.

Table 2: Conformation of the sub-samples in each Barinesa HEI

Stratum	Institution	% corrected	Subsamples
Public institutions	UNELLEZ	57,14	117
	UPEL	14,29	29
	UNA	28,57	59
Private institutions	IUPSM	10,53	22
	IUTAC	63,16	129
	IUTAJS	26,32	54
Total			**410**

Every student was asked about the educative uses of Internet, skills in the technology handling and academic performance. Altogether, 410 questionnaires were answered. With a 95% of confidence it can be affirmed that the error attributable to the sampling and other random effects is ± 5% (Arkin & Colton, 1965). Additionally to the sampling error, the way in which the questions were formulated and the practical difficulties to carry out the survey, can be introduce some additional error or inclination in the results. The type and design of research adopted was non experimental, cross-sectional, descriptive, causal, with quantitative approach.

RESULTS AND DISCUSSION

In this section, the principal findings obtained throughout the research development are discussed. The information contained in this section, has been carefully organized according to the following scheme:

- Results referred to the practices of ICT use in the local university context. The most important characteristics of the profile like users of the Network with educative aims, of the Barineses university students are delineated.

- Results referred to causal analysis among educational uses of ICT, technological skills and academic performance. Section of the article dedicated to the formulation of a hypothetical causal model among the variables before indicated, which were developed using the Path Analysis technique implemented with the aid of LISREL© program.

Technological profile of the Barineses university students

From the analysis of **Figure 1**, it is deduced that among the local university students, that are Internet users, the intensity of use of this tool can be catalogued like moderate. A little more than a third (34.9%) of them remains connected four hours or more a week. The percentage of students who exhibited an intensive use of the network - more than 12 hours weekly – only reached at 5.1%. If we compared these numbers with the intensity of Internet use showed by the American college students - 74% more than four hours weekly and 19% over 12 hours (Pew Internet & American Life Project, 2002) - will be clear why the Internet intensity use of the local college students is described as moderate. Nevertheless, a considerable 37% of the Barineses college students, uses most of the time of Internet connection (more of 50%), in activities related to their studies.
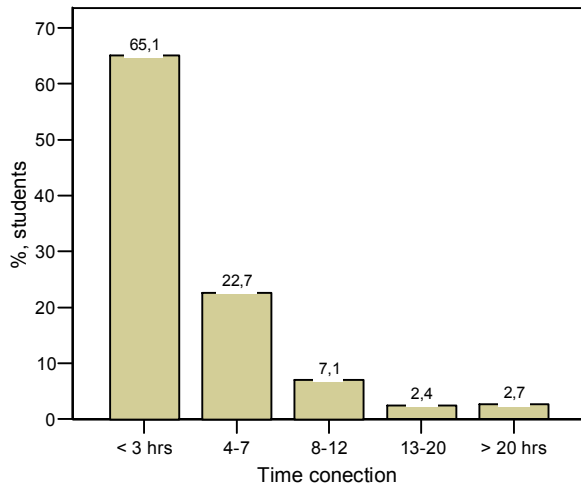
**Figure 1. Weekly intensity use of Internet.
Variable: v6.**

The local college students who had a PC at home - with its respective peripheral ones - reached a 33.2%, and of them, those who had a Internet connection from the comfort of their houses, reached 26.67% (**Figure 2**). According to the article of Perez Diaz (2006), at level of the Venezuelan population in general, the availability of computers in the home is commonest in the AB class (64.1%) that in the E (7.3%). Of those computers, they were connected to the Network in AB class (28.2%) and in the E (1.4%).
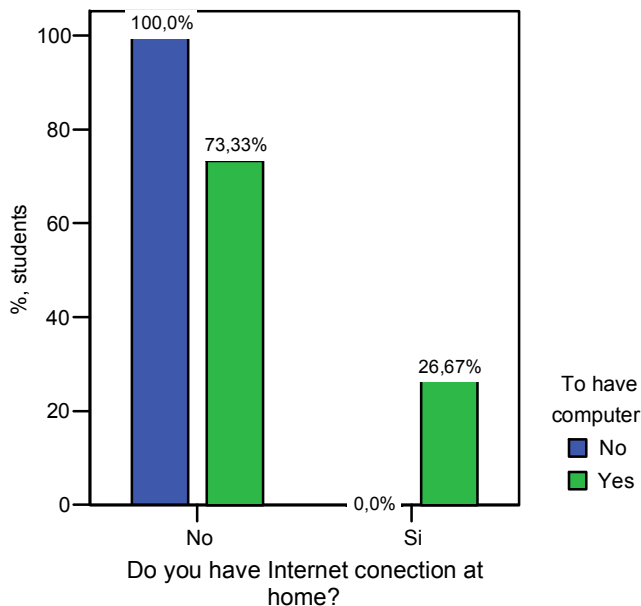
Figure 2. Students w/computer distributed for access to Internet. Variables: v7-v9.

According to **Figure 3**, the printers (32%) were the peripheral one commonest in the homes of the Barineses young people, followed by scanners (19%) and the CD recorders (18%). Returning to the data contributed in the article of Perez Diaz (*op. cit.*), seems that the use of the technology is reinforced more and more in the Venezuelans, and therefore in the Barines. This tendency is more frequent as the age of the person is younger and the level education higher. According to the data that they contribute, the cellular telephone is present in 85% of AB class and in the E, the index of penetration reached 54.2%. Young people are the main users of MP3 players with 43.6% in segment AB. The digital camcorders have a masculine rate of penetration of 30% in the ABC class. The digital cams are used mainly by the ABC class in a percentage that reaches up to 28% of the population. Additionally, in AB classes the penetration of the DVD players is of 80%, while in class E is 35%.
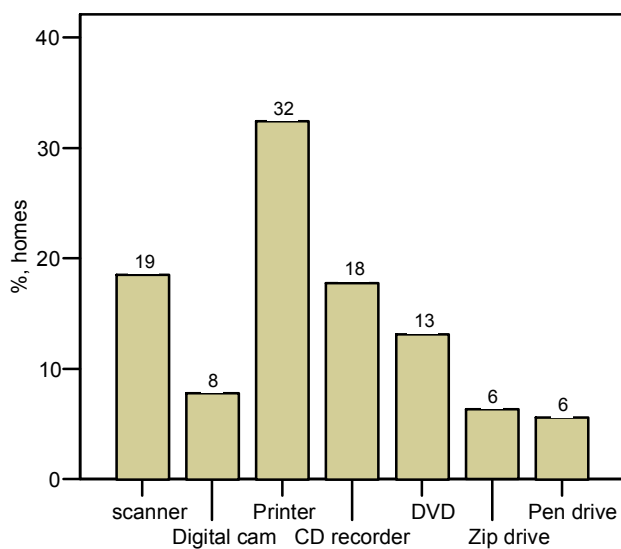

Figure 3. Technological equipment at homes of the barineses university students. Variables: v12a - v12g.

The frequency with which the Barineses college students use the computer in the studies, varied substantially, from one university to another (**Table 3**). The patterns of use of the computer grouped themselves in three categories, that is to say: High (Every day), Medium (Once for week) and low (Monthly, occasional or never). In the UNA, a 23.3% of their students reported a low level use of the computer, compared with the low percentage in this category (3.6% and 8.5%) shown by the IUTAJS and the UNELLEZ. In the IUTAJS and the IUPSM, the students showed the highest percentage of the computer daily use, with an 85.5% and 75.0%, respectively.

Table 3: Frequency use of the computer in the studies,in each Barinesa HEI

|		Current Frequency of computer use		
		High (%)	Low (%)	Medium (%)
Educational institution	UNELLEZ	72,6	8,5	18,8
	UNA	51,7	23,3	25,0
	UPEL	58,6	13,8	27,6
	IUTAC	52,7	20,9	26,4
	IUTAJS	85,5	3,6	10,9
	IUPSM	75,0	10,0	15,0

On the other hand, related to the intensity of use of ICT as a tool in the academic activities, among the local university students; it emphasizes in **Figure 4** that the university institution where there is a more intensive use of the technology, was IUTAJS ($\overline{v}_{prom} = 1,22$)[4] and the university centre where this use is more moderate, corresponded to UPEL ($\overline{v}_{prom} = 0,575$). It is important to remember here, the scale used to measure this construct: 0 = Never; 1 = Some times; 2 = frequently; 3 = Very frequently; 9 = Don't Know/Don't answer. Therefore, it is emphasized that the participation of the local college students in good educational practices related to the technology-network, had a noticeable character of occasional, since in average, the value of this indicator was located around the score of scale "1 = Some times".
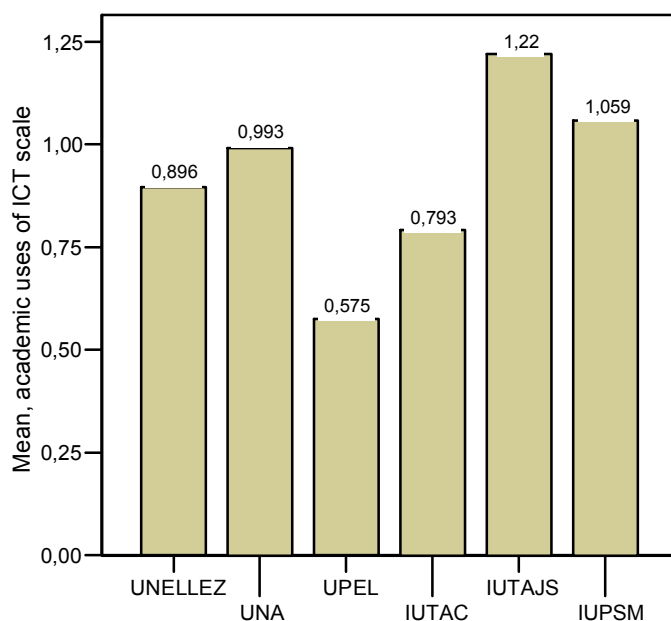
Figure 4. Average in the scale of academic uses of ICT, in each barinesa HEI. Variables: v00-vprom.

In the following question, the students were interrogated about the general perception they had in relation to the integration of ICT in its studies. As it shows **Figure 5**, three fourth parts of the Barineses university students consider that the technology is little or partially integrated in the pensum of their careers (75.31%). Hardly a 24.69% considered that the ICT was well integrated in their university. When this variable was examined, discriminating by institution, were substantial differences among universities. In some of them the opinions of the students about the integration level of ICT, clearly they were divided. Like in the cases of the IUTAC and the UNELLEZ, where to the total of students who thought that the ICT was partially integrated in the pensum, these institutions contributed to 32.79% and 30.84% respectively. As well, these same universities contributed to 27.72% and 20.79%, to the total of students who considered that the ICT was well integrated in the studies.
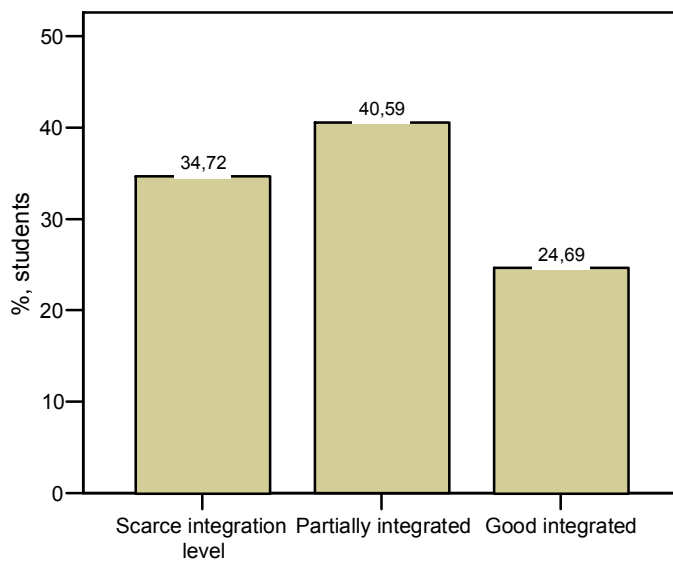
**Figure 5. Integration levels of ICT in the universities ,
according to the students' perception. Variable: v47.**

The confidence of the students in the use of ICT in the studies, varied among universities, although in all, the majority of the students was in the two higher levels of the indicator **(Figure** 6); and students' percentages that proved to approach to the technology with Little or a Lot of suspicion, turned out to be very small – so much among the owners of PC like among not owners -. The UPEL and the UNELLEZ presented students' lowermost percentages with a lot of confidence in technology. It is not a surprise that between 0 % and 20 % of the students yield any apprehension with ICT once their probable deficiency of knowledge about their careers expected by themselves. The confidence in ICT was influenced lightly for the field of studies, with the majority of the scientists and engineers (75.2 %) and to a lesser extent the students of Sciences Health (33 %), reporting high confidence levels in the same.
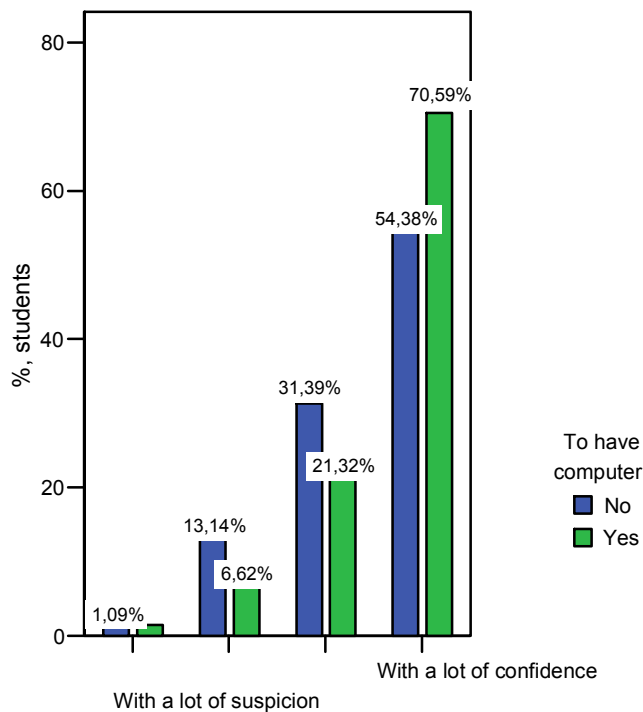
Figure 6. Relationship between confidence in the use of ICT and the availability of computer at home. Variables: v45-v7.

Model of causal relations among educational uses of the ICT, technological skills and academic performance of the Barineses university students

To complete the quantitative analysis of the possible causality relations among the educational uses of ICT, technological skills and the Barineses university students' academic performance, it was used the technique of structural equations modelling with observable variables, by means of the utilization of the LISREL© program. The goodness of fit measures revealed that the *path analysis* proposed (**Figure 7)** represent the empiric data adequately. In fact, the root mean square error of approximation (RMSEA) was to the almost perfect level of 0,000, with a normed fit index (NFI) of 1,00 and a comparative fit index (CFI) also of 1,00.

The path analysis for the local students' technological skills evidenced appreciable effects of the majority of the indicators on the number of applications, that Barineses university students declared themselves to drive independently (**Table 4a)**. The highest effects came, in the first instance, of an aspect pertaining to the surroundings of the student and, in second instance, of indicators that they relate with your individual behaviour in front of ICT. The possibility of having access to Internet from the PC installed at home had the biggest effect in the model (b=.57) [5]. They kept on in order of importance: The confidence in the use of ICT in the studies (b=.35), the experience with e-Learning's elements that the student was having (b=.31), the years using a computer (b=.29), the number of accounts of e-mail (b=.27), the frequency of use of the PC in the studies (b=.20), the fraction of the weekly connection time dedicated to the academic work (b=.18) and the years of experience using the Internet (b=.17). Engaging in *good educational practices* related with technology, that previous researches have highlighted his positive effects on the student success, had also an impact, although modest much more than the previous

(b=.07). It is important to notice that although the loading of this exogenous variable was small, its level of meaning was the highest among all the variables of the model (significant at level .001).

Table 4a: Structural Equations Model for ICT Skills Index and Academic Performance. Endogenous variable: ICT Skills Index

Exogenous variables	ICT Skills Index
Technological Equipment of the centers (vetc)	-1.42
	-0.020
Time of weekly connection to Internet (v6)	1.46
	0.17
To have PC at home (v7)	1.03
	0.10
Access to Internet from home (v9)	1.68*
	0.57
Complementary technological equipment household (v12t)	0.58
	0.028
Use of the computer in the studies (v14)	2.00**
	0.20
Experience in the use of the PC (v16)	3.37**
	0.29
Numbers of e-mail accounts (v18)	2.48**
	0.27
Fraction time of weekly connection dedicated to the studies (v21)	2.52**
	0.18
Experience using Internet (v22)	1.75*
	0.17
Academic uses of ICT (vtua)	4.06**
	0.07
Importance perception of ICT in the career (v44)	0.080
	0.049
Confidence in the use of ICT (v45)	2.73**
	0.35
Experience with elements of e-Learning (v46t)	2.64**
	0.31
Level of integration of ICT in the university curriculum (v47)	-0.30
	-0.032

* p < .10 (The parameters of the model that proved to be significant to this level, you would have taking them with caution because their significant levels are bigger than the sampling error of 5 %)
** p < .05

The part of the path analysis referring to the Academic performance of the Barineses university students revealed effects of, very little relevance, of the indicators considered in the model on this one endogenous variable (**Table 4b**). Thus, indicators related to status socioeconomic of the student, such as: educative and professional level of the father had the strongest effects (b=.014; b=.011). Nevertheless, only the second was significant at level .05. These results seem to support, the often highlighted thing in literature on the subject, in relation to the difficulties found until now by the researchers, to demonstrate the effectiveness of the use of ICT on the results in

the studies; and it again puts in centre of the debate the paradox of the no significance (Russell, 1999).

Table 4b: *Endogenous variable: Pondered Academic Performance*

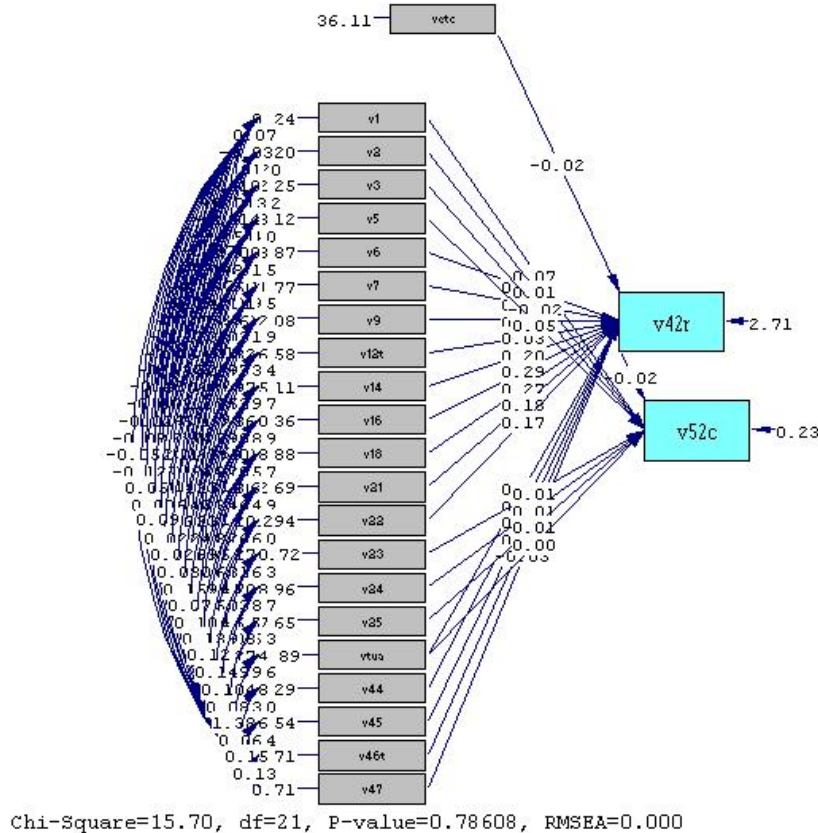| Exogenous variables	Pondered Academic Performance
ICT Skills Index (v42r)	-1.19
	-0.016
Sex (v1)	1.42
	0.074
Age (v2)	0.22
	0.0054
Dedication to the studies (v3)	-0.42
	-0.022
Origin (v5)	0.67
	0.048
The father's professional level (v23)	2.24**
	0.011
The father's educational level (v24)	1.16
	0.014
The father's income (v25)	0.035
	0.0086
Academic uses of ICT (vtua)	0.81
	0.0037

$p < .10$
** $p < .05$

A possible explanation of this result can be deduced if we reviewed the findings found by Wenglinsky (1998), who used models of structural equations to explain the results in the mathematical subject in students of fourth and eighth degree of basic school in the U.S.A. He found, among other important findings, that the effect of the ICT use on the academic performance can be very different in students immersed in a rich atmosphere in technology than on those in more conventional surroundings. According to that premise, since it doesn't fit to the reality to say that the Barineses student university are habitually in atmosphere highly techno, we can assume that the impact of ICT on the results in the studies, can be attenuated by the conditions technological of the context.

In agreement with the previous reasoning, the technological equipment of the university centres (intervener variable) did not have a significant effect on the technological skills of the students (b=-0.020). Based on this result, it is considered that it is not the same that all the students have a computer in their classrooms or that they share a PC among several or there is computer science laboratory in centre, where students go from time to time. In this last configuration, it is expected that the effects of the use of ICT on the results in the studies were weaker than in the first configuration. This situation, in our opinion, is reflected by the causal model.

Figure 7 shows the causality relations among the diverse exogenous variables - indicated in the Tables 4a and 4b - with the technological abilities and the academic performance, reported by the Barineses university students.

Figure 7: Causality relations among the diverse exogenous variables considered in the hypothetical model and the dependent variables: ICT Skills Index and Academic performance.

Finally, as it is reported in the bibliography, different models can exist and, they can reach statistically consistent results. For it the previous model with a saturated model was confronted, that implies that all the variables included in the model, are related to each other, and a model where all the studied variables establish solely direct influences (they are independent). The results indicate that the proposed model reaches results more excellent than the saturated model and the independent model; the results suggest than the proposed model attains more relevant results than the saturated model and the independent model; for example, when comparing the values of expected cross-validation index (ECVI) [6] of these three models we met than, for the proposed model ECVI 1,44 while that for the models saturated and independent, the values of ECVI were 1,55 and 9,85 respectively. These values contribute to give greater sustenance to the obtained findings.

CONCLUSIONS

The majority of the goodness fit statistics for the hypothetic causal model proposed (Figure **7)**, revealed that the same, represent adequately the empiric data collected by means of the

questionnaire application. These results suggest that the mesh of causality relations in the model was confirmed by the observed data.

The path analysis for the technological skills of the local students, demonstrated appreciable effects of indicators like: a) to have access to Internet from the PC installed at home, b) the confidence in the use of ICT in the studies, c) the experience with certain elements of e-Learning, d) the account number of email that the student had, e) the years using a computer, f) the frequency of use of the PC in the studies, g) the fraction of the weekly time of connection dedicated to the academic work, h) the years of experience using Internet and i) to get involved in good educative practices related to the technology. The indicator referent to the technological equipment of the Barineses university centres did not affect significantly the levels of e-Literacy (scores in the ICT Skills Index) of the students.

The part of the path analysis referring to the Academic performance of the Barineses university students revealed very little important effects of most of indicators considered in the model, on this one endogenous variable. Thus, only an indicator related to socioeconomic status of the student, that is to say, the professional level of the father had a significant effect.

These findings agree with the conclusions reached in frequently mentioned Russell`s work (1999) who has said: "There is nothing inherent to the technology that causes an improvement in the learning.", although, "the process to redesign a course to adapt its content to the use of the technology can improve the course and improve the results". Or, the position somewhat more categorical of Bates (2001, pp. 243 - 244):

> Most of the teaching staff and of the postgraduates' students usually they begin to evaluate the relative effectiveness of the education based on the technology, compared with traditional direct education. Although this can be necessary to be able to integrate the most reticent professors, this plan concrete of research is frankly loss of time. The results are beforehand known.

Consequently:

The compound hypothesis of research (H_1) was partially confirmed by the collected empirical data. The part of the hypothetical causal model related to the students technological skills - ICT Skills Index - received the greater amount of empirical sustenance. Contrary, the section of path analysis related with the students Academic performance only was influenced by the indicator: the father professional level.

Finally, we expect that the information collected during this research, and the attained conclusions, have contributed to raise the understanding that one was having about the technology handling, skills and attitudes toward ICT, and the possible relation of these two factors with the results in the studies, in the Barinesa higher education.

Endnotes

[1] ICT Skills Index means "Indice de habilidades en TIC". Simply, the person is asked about his/her capacity to accomplish determined tasks, alone or with a certain amount of help, using 10 applications software of common use. The punctuations in this index fluctuate in [0, 10]'s interval, depending on if the individual manages none or all applications.

[2] In general, the term *student engagement* refers to the attitude, needs, desire or obligation of the student of participating and engaging in its own learning process. In Kuh & Nelson

research, and in the present study, it is assumed like: How much the students get involved in true educational effective practices supported in ICT?

3   These *educational effective practices*, they are such like: Using the Internet to be connected with other students and for to find information, to send the professor an e-mail to clarify doubts on an assignment, to coordinate with classmates for telematics media a working party's activities, etc.

4   The notation $\bar{v}_{prom}$ makes reference to the average score obtained by the students in the scale of educational uses of ICT (variables v26 to v41 of the questionnaire).

5   The notation b=.xx it is used for indicate "structural coefficients" that measures the effect of an independent variable (exogenous) over a dependent variable (endogenous). In programs for modeling SEM, like LISREL©, corresponds to the values deployed on the arrows in the proposed model's diagram.

6   Smaller values in the ECVI are indicatives of goodness fit in the model.

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