Information and Communication Technologies used by undergraduate students in their academic and socialization activities

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Abstract: The growth of availability and access to Information and Communication Technologies (ICT) in higher education in Mexico is a fact. Nevertheless, not much is known about how students use these resources in their school and social activities. A survey to obtain information about how undergraduates use web resources and cell phones was designed and applied to a stratified sample of students from 17 Undergraduate programs that are offered at the Campus Azcapotzalco of the Autonomous Metropolitan University (UAM-A). The aim of the survey is to support faculty with data to design school activities that could use these technologies and improve students learning. The results pointed out that the greatest part of the students has access and use the ICT, even though the socioeconomic level, as students of a public school, is rather low. E-mail and websites as Wikipedia, Google, Messenger and Hi-5, are highly used by our students; most of them have a cell phone and use it for amusement and entertainment activities, and still more, many of them use the cell phone in their school activities to interchange and share documents, take notes, photograph teachers' annotations on the blackboard, record classes, etc.

Introduction

Information and Communication Technologies (ICT) have released a world of possibilities for education. Although some years ago they were only considered an alternative to reinforce online education, nowadays they are an irreplaceable resource in all educative modality. ICT, especially the tools available in Internet and the mobile devices have allowed the development of new concepts on educational practice and research as multimedia learning, b-learning, m-learning and u-learning. Nevertheless, we know that the real impact of ICT will be possible only by means of the comprehension of its pedagogic function to promote learning. Young people of recent generations seem to own a natural skill to appropriate the technologies and to incorporate them fully in their daily activities. As Prensky (2001) affirm, they are digital natives, "people that were born and grow with the new technologies as part of his daily family and social circle". Until we understand the way in which students use technological resources we'll be able to design instructional and didactic strategies to facilitate and enhance learning with ICT.

In Mexico, like in a large extent of the world, the number of users who have access to ICT increases day by day. The results of the National Survey on Availability and Use of the Information Technologies at Home, (INEGI, 2007) between February and March, 2007, registered 30.5 millions of computer users, more than twice registered six years before; the number of Internet users, from 2001 to 2007, increased from 7 millions to 20.8 millions; 12.3% of Mexican homes are connected to Internet, half of which are provided with wide band; 22.1% of Mexican homes, by March of 2007, owned at least one computer, which approximately correspond to twice the equipment reported in

the 2001. Based on the INEGI's survey and other studies realized by the Federal Commission of Telecommunications (COFETEL), the growth of Internet users in Mexico from 2001 until 2007 is transformed up graphically in figure 1:

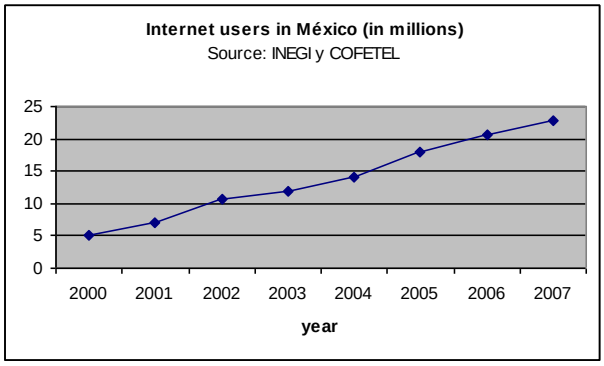


Figure 1. Historical record of the number of Internet users in Mexico from 2000 to 2007

As it can be observed in Figure 1, a growing trend has been maintained, which would allow us to predict the number of Internet users beyond 30 millions in Mexico by 2010. González-Videgaray (2007) points out that "the behavior pattern indicates that growth will continue in next years, so the resources of the information and communication technologies will be more accessible for great part of Mexican population".

ICT tools can improve the quality of education but it is not enough, as Balzhiser, (1996) indicates: "technology is only the beginning to make the difference". The way in which we use these technologies is fundamental. Let us remember that in advanced levels of appropriation, ICT are used "like a tool that facilitates the multiplicity in knowledge representations, simulation and problem solving." (Montes, 2006).

1. The survey

This paper is a report on the findings of a study conducted at Campus Azcapotzalco of the Metropolitan Autonomous University, which is the second public university in México City. It offers 17 school programs at undergraduate level, structured in three Schools: Sciences and Arts for Design (CAD); Basic Sciences and Engineering (CBI); and Social Sciences and Humanities (CSH). The study tries to explain the way in which the technological resources are used by the students in their school and social activities depending on their major and their program of studies. Later, faculty could use those results to design and release didactic strategies for promoting learning.

Method

A stratified sample of 350 students, representative of the campus population, was selected. Student population of each program in the last annual report presented by the Campus Dean was taken into account to find the size of sub-samples. (De Garay, 2007). The method consisted of the election of variables, the instrument's design, a pilot application, processing and analyzing the data and obtaining conclusions.

The data collection was carried out during ten days, from July 4 to July 14, 2008. The survey was directly applied in each classroom. It was designed to be applied in paper and not through Internet since we considered this option more suitable and faster for the students. Some groups of students were chosen at random to complete the established quota, selecting groups between the fourth and ninth trimester. The questions were designed with general topics, appropriate for all bachelors' program. The sample design allowed us to obtain data of the campus as a whole and of each school and undergraduate program. Approximately 75 % of the students were between the 19 and 24 years of age (CoPlan, 2007).

The substantial content of the survey was classified and formulated in seven variables:

- Tasks and individual activities to obtain general and specific information

- Cooperative activities and teamwork using websites and cell phones
- Socialization activities
- Place, objectives and frequency of Internet connection
- Type of transfer to school and commuting time
- Ownership and use of the cell phone
- Use of virtual classrooms or educational platforms

The target of the study was to identify the technological tools more used by students in their activities such as information search and exchange, generate agreements on shared tasks and interact and socialize with their partners in the university.

2. The results

2.1 Tasks and individual activities.

First items of the survey reply to the search of general and specific information. Turned out at Campus it can be observed a noticeable superiority of Google (91.12 %) in searching general information. The preference to Google was very similar between Schools, especially between the students of CBI and CSH who showed 90.3 % and 89.9 %, respectively. The students of CAD were lightly above with 94.1 % in the preferences of Google over other browsers.

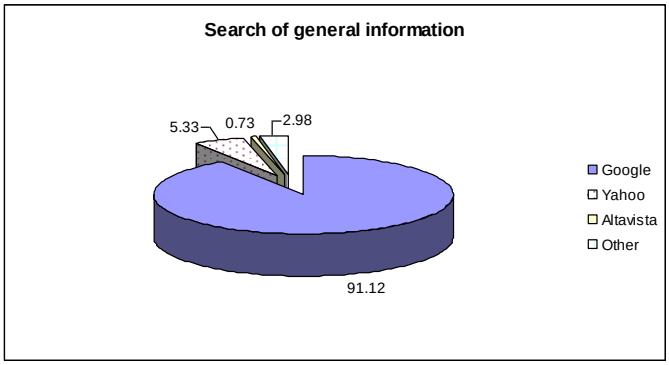


Figure 2. Search of general information

On consulting specific information Wikipedia is the most used (71.32 %); the changes on preferences were trifling between CBI and CAD (1.92 points), and between CBI and CSH (2.89 points), nevertheless, between CAD and CSH were most important (4.81 points). Considering the results by Undergraduate program, Economy; Electrical Engineering; Mechanical Engineering; Metallurgical Engineering; Graphic Communication Design and Architecture are the Undergraduate programs that show the use of Google in a proportion superior than 95 %. Physics Engineering; Metallurgical Engineering; Sociology; Industrial Engineering and Graphic Communication Design prefer Wikipedia with more than 80 %.

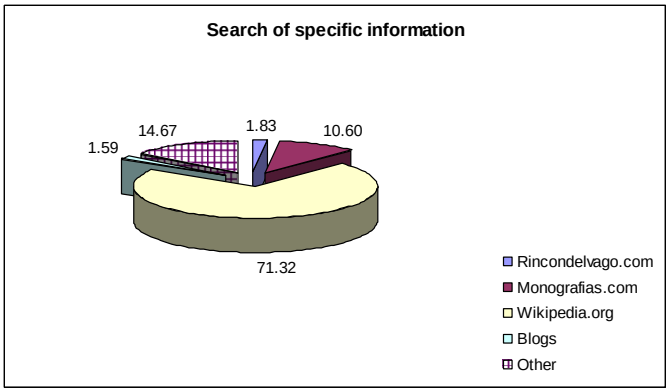


Figure 3. Search of specific information

2.2 Developing teamwork and other cooperative activities. Some items focus on the resources that students use when they organize work and do agreements out of the campus. To reach agreement on collective tasks, campus population used Messenger with 41.71 % average, followed by the cell phone in all his variants: voice, messages or both, with 29.95 % average, nevertheless, to share information, the Messenger (30.13 %) was widely overcome by e-mail which occupies the first place with 48.33 %. Organizing team work, Messenger has the preference of the population of all the Schools but CAD occupies the first place with the major rate (54.81 %) and CSH the minor rate (34.19 %). To send and receive information and documents the main differences observed was between CAD and CSH. In the first case, the preference rate of the e-mail was a 38.29 %, whereas in CSH was 60.46 %. By Undergraduate program, Messenger was the most used resource for agreement in collective tasks by students of Graphic Communication Design, Economy, Architecture, Civil Engineering, Metallurgical Engineering, Computational Engineering and Chemical Engineering with a rate higher than 50 %; Law and Mechanical Engineering registered the lowest: 11.11 % and 7.69 % respectively. E-mailing is preferred to share information, by students of programs of Electrical Engineering, Engineering Physics, Law, Mechanical Engineering, Industrial Engineering, Sociology, Electronic Engineering, Economy and Administration in a 50%.

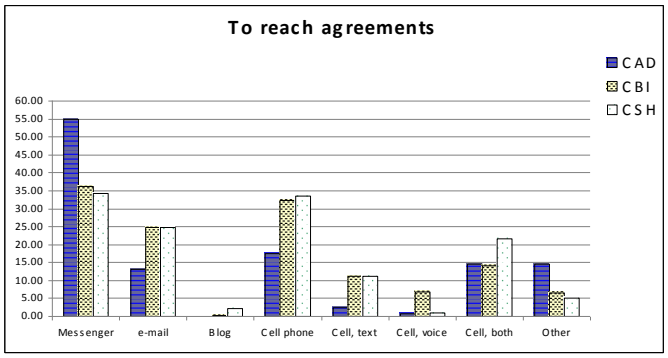
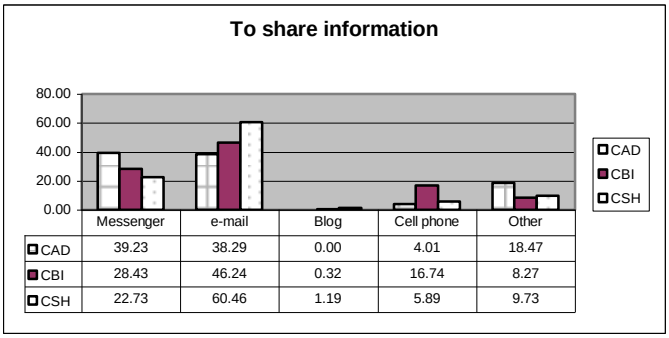


Figure 4. Organizing work and doing agreements out of the campus



	Messenger	e-mail	Blog	Cell phone	Other
CAD	39.23	38.29	0.00	4.01	18.47
CBI	28.43	46.24	0.32	16.74	8.27
CSH	22.73	60.46	1.19	5.89	9.73

Figure 5. Organizing teamwork and share information

2.3 Socialization with university's partners and belonging to social networks in Internet when students are outside the campus. These items inquire into their preferences using digital tools to establish informal communication, chatting, sharing photos and videos, listening music, not strictly school activities. The students indicated that, to socialize, they mainly use the Messenger (48.88 %). About belonging to Internet social networks, 62.61 % answered yes, being Hi-5 (53.42 %) the one that occupied the first place, whereas 34.92 % of the students denied belonging to any social network. By Schools, there is again a clear incidence of Messenger over other resources in three Schools, nevertheless, the main differences were observed between CAD (51.28 %) and CSH (40.73 %). In belonging to social networks, we observe CAD (75.26 %) and CSH (53.77 %). Of these networks, Hi-5 turned out to be the most popular although CAD (61.25 %) emphasizes in a special way. Other Schools that stayed very nearby was CBI and CSH (49.73 and 49. 27 % respectively). Considering by Undergraduate program, Engineering Physics and Graphic Communication Design students indicated a rate preference of 75 % and 72.50 % for Messenger, whereas the students of Industrial Design, Civil Engineering and Law, get the lowest indexes with 33.33 % in the first two cases and 25.93 % in the last one.

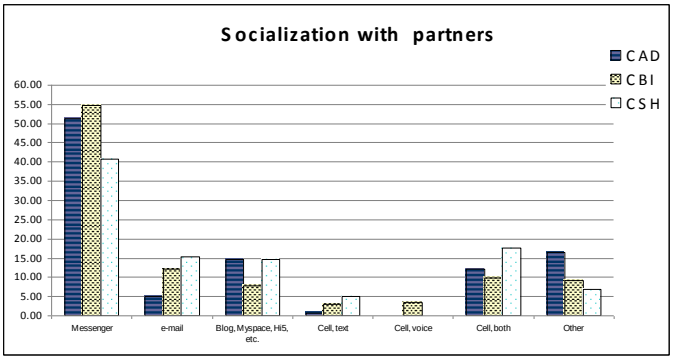


Figure 6. Socialization with campus's partners

2.4 Place and frequency of Internet use. Students were asked about the frequency per week they were connected to Internet and the place where they mainly do it. Results indicate that 53 % of the students get connected more than five times per week and only 9 % said to get connected occasionally. The place from which they do it more is their home. CAD students are the biggest population that use the computer from home, 65.29 %, followed by CBI with 57.81 % and at the end CBS with 56.08 %. Undergraduate programs with students using the computer more than five times per week are: Graphic Communication Design, Computational Engineering, Sociology, Industrialist Engineering, Chemistry Engineering, Industrial Design, Mechanical Engineering, Architecture and Electronics Engineering.

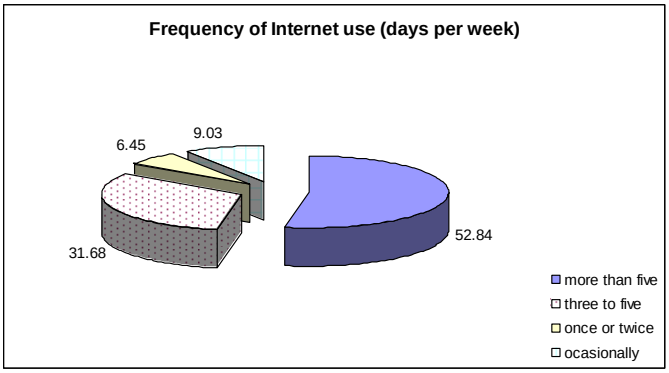
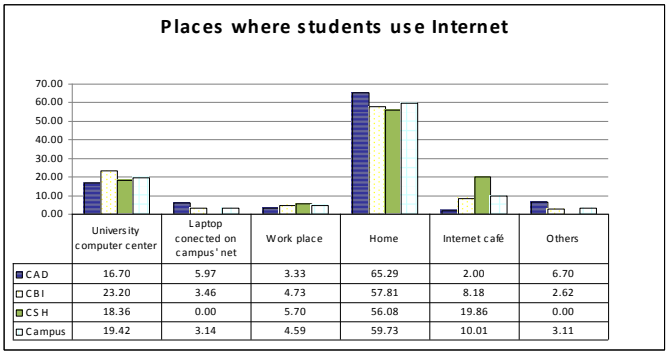


Figure 7. Frecuency of Internet use



	University computer center	Laptop conected on campus' net	Work place	Home	Internet café	Others
CAD	16.70	5.97	3.33	65.29	2.00	6.70
CBI	23.20	3.46	4.73	57.81	8.18	2.62
CSH	18.36	0.00	5.70	56.08	19.86	0.00
Campus	19.42	3.14	4.59	59.73	10.01	3.11

Figure 8. Places where students use internet

2.5 Type of transport and commuting time. They were asked if they use public transport to commute and the average time they spent on it. All Mexican students live off-campus, so we considered these questions very important. They were included to explore the possibility of using part of this time in learning activities using mobile devices. Turned out at Campus, 77.53 % of the students indicated that regularly uses public transport to commute. The differences by Schools are important: CAD has the minor percentage of students who use the public transport, (78.91 %) and CSH has the maximum (86.56 %). In three programs, Environmental Engineering, Physics

Engineering and Sociology, 100% of the population uses public transport, whereas Mechanical Engineering, Industrial Design and Metallurgical Engineering scarcely come about 50 %. The highest indexes of commuting time are from one to two hours for the three Schools.

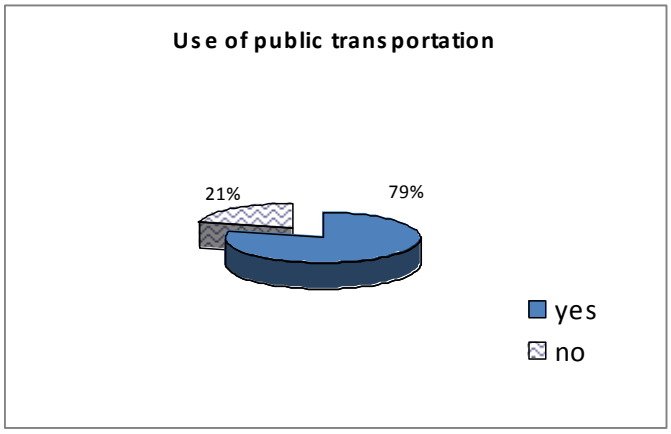


Fig 9. Use of public transportation

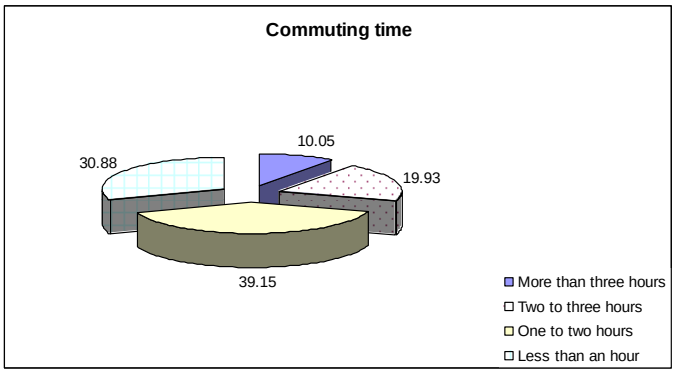


Fig 10. Commuting time

2.6 Use of the cell phone. The mobile or cellular phone is having a very important presence in the social sector and the university does not escape to it, so we decided to include four items regarding the phone possession, communication preferences (text messages or voice), and additional uses and applications in school activities. Turned out at Campus, 93.61 % of the students declared to possess a cell phone of which more than 70 % are multimedia phones. About the style of communicating 55 % do it preferably for text messages, 16 % prefers conversation and the rest (29 %) uses approximately both means equally. They were asked about the functions more used in his phone besides communicating. 38.85 % use it preferably to listen music and 17.79 % to take photography and personal and familiar videos. Another question was if they had used his cell phone in some school activity and only 34 % said they have done it. The change between Schools is minimal and it ranges from 92.59 % (CBI) to 95.03 % (CSH). Concerning the preference of using the cell phone to send text messages, again there is a big consistency between the Schools. The change goes from 52 % (CBI) to 56 % (CAD and CSH). Related to other uses of the cell phone, music takes the first place although, the differences are notable since the minor percentage obtained is CBI students (25.93 %) and the largest is CSH students (55.44 %). Turned out by Undergraduate program, Graphic Communication Design, Environmental Engineering, Architecture, Mechanical Engineering, Chemical Engineering and Metallurgical Engineering, stand out in the use of the cell phone. Other activities that were mentioned are: capture of photography in laboratory practices, exhibitions, museums, book pages, and chalkboard, or to keep information and to transfer files with activities and notes of class.

2.7 Use of virtual classrooms or educational platforms. Campus Azcapotzalco released a Virtual Education Office in 2006 to promote b-learning. The use of virtual classrooms is acquiring importance in Mexican universities but it is disappointing that 63.44 % of our students have never used educational platforms and only 24.55 % from

CBI have used Moodle, which is our institutional platform in this Campus. It is surprising that, Blackboard turned out to be most known with 8.2 %.

Conclusions

We have considerable evidence that students at this campus have incorporated the ICT for academic and socialization activities. From the data collected it was possible to observe that exists a clear advantage of a few resources over others. Google and Wikipedia were the most selected sites for information search and consultation for specific subject-matters; Messenger was preferred to socialize and the e-mail was selected to share information. Besides, more than half the students of the campus use Internet more than five times per week and even most of them navigate from home. We assume that the average age of our students is an important factor to explain such a phenomenon because they are digital natives (75 % of our scholar population is between 19 and 24 years old). With regard to the differences between schools, design students (CAD) showed a higher affinity to the use of Google, Wikipedia and Messenger. It is reasonable to assume that these students, whom daily work with images, have showed a major tendency to use the technological resources that allow them to incorporate easily images, animations and sounds. Besides, they belong at least to a one social network in Internet, especially Hi-5 that allows them a communication that includes more sensorial stimuli than the e-mail. In contrast, social sciences students (CSH) showed the highest rates of use of e-mail and cell phone (95.03 %). Perhaps these differences could be explained from the Holland's theory (1986) on types of personality and environmental models. This author classifies the types of personality as psychomotor, intellectual, of support, of conformity, persuasive and esthetical. Thus, in accordance with this theory, design students CAD), connected to esthetic contents, have a tendency towards the use of images. In addition, graphics are fundamentally their communication language. Social sciences students (CSH) are related with support (Sociology and Law), conformity (Administration and Economy) and persuasion factors (Law). For this group of CSH students, oral and written communication is fundamental. Finally, engineering students (CBI) are related to the process of logical reasoning and calculation, where, according to Holland (op. cit.), the esthetic and theoretical aspects do not have great relevance. Thus, the use of computers (as logical information processor) is essential for students of CBI, but lacking the esthetic and visual tendency that the design students have, neither the preference towards the oral and written communication that CSH students have.

The study also showed us how a given students' sector use their cell phone in an ingenious manner in their school activities. Within the most special uses are:

- To take photographs in laboratory's practices, exhibitions, museums, pages of books and even, to remember what the teacher wrote in the blackboard
- To keep information and to transfer files regarding tasks and class' notes
- To record the classes or conferences
- To generate and to share documents in text processors, spreadsheets and presentations
- To get connected to Internet to do searches
- To send and receive messages concerning school activities

Faculty ought to take into account that web sites, browsers, networks, Blogs and cell phones are tools that students make use of. These data indicate us the manner that it's best for them. Therefore, teachers must generate instructional materials and digital didactic documents that encourage the ingenious and innovative use of the ICT in education, including the mobile devices as cell phones, i-pods, PDAs, etc. Nevertheless, we must use them not only "as a tool that facilitates the storage, transmission and organization of the courses' content, without a significant difference between face to face courses and others courses supported by ICT " (Montes et al., 2006), but also as a way to improve the quality of learning and to support the development of thought skills (Jonassen and Yueh, 1998). The infrastructure, the web tools and the access to open code resources are already available at our university. The students know how to use them. So our goal as faculty is to develop instructional and didactic strategies to promote and improve their use for the impulse to e-learn in Mexico.

References

ANUIES (2003). Estudio Sobre el Uso de las Tecnologías de Comunicación e Información para la Virtualización de la Educación Superior en México. Ed. Asociación Nacional de Universidades e Instituciones de Educación Superior, México. [Online], Available: http://virtuami.izt.uam.mx/pfd/pdf/vir_mx.pdf [March, 2008]

Balzhiser, Richard E. (1996). Technology - it's only begun to make a difference. The Eletricity Journal, may, 1996.

Comisión Federal de Telecomunicaciones (COFETEL) 2005.México. [Online], Available: http://www.cofetel.gob.mx

Coordinación General de Planeación CoPlan (2007). UAM-A, Resultados de la Encuesta Socioeconómica, Hábitos de estudio y prácticas de consumo cultural de los alumnos de nuevo ingreso, Trimestre 05-P, [Online], Available: http://coplan.azc.uam.mx/web/documentos/SisInfEEE/Estudiantes/NuevoIngreso05-P.pdf [Jul, 2008]

De Garay Sánchez, A. (2008). Informes de Actividades 2007, Universidad Autónoma Metropolitana, Rectoría de la Unidad Azcapotzalco. [Online], Available: http://coplan.azc.uam.mx/web/documentos/anuarios/2007/anuario2007.pdf [Jun, 2008]

Directorate General for Education and Culture of the European Commission. (2001). Survey report: Students' perceptions of the use of ICT in university learning and teaching, [Online], Available: www.spotplus.odl.org/downloads/Survey_report_final.pdf [March, 2008]

González-Videgaray, M.C. (2007). Evaluación de la reacción de alumnos y docente en un modelo mixto de aprendizaje para educación superior. RELIEVE, v.13, n.1, p 83-103 [Online], Available: http://www.uv.es/RELIEVE/v13n1/RELIEVEv13n1_4.htm. [October, 2007].

Holland, John L. (1986). Técnica de la elección vocacional. Tipos de personalidad y modelos ambientales. Trillas, México.

Jonassen, D., Carr, C. y Yueh, H. (1998). Computers as mindtools for engaging learners in critical thinking, TechTrends, citado por Montes y Solanlly (2006).

Montes González, J., Solanlly Ochoa, A. (2006). Apropiación de las tecnologías de la información y comunicación en cursos universitarios, Acta Colombiana de Psicología 9(2): 87-100, 2006, Ed. Pontificia Universidad Javeriana, Cali, Colombia. [Online], Available: http://www.scielo.org.co/pdf/acp/v9n2/v9n2a09.pdf [March, 2008]

Ortega Amieva, D. (2004). Estudio sobre el uso de las tecnologías de comunicación e información para la virtualización de la educación superior en México, Ed. Asociación Nacional de Universidades e Instituciones de Educación Superior (ANUIES), México. [Online], Available: http://www.anuies.mx/e_proyectos/pdf/Univ_virtual.pdf [March, 2008]

Prensky, M. (2001). Digital Natives Digital Immigrants: On the Horizon, NCB University Press, Vol. 9 No. 5. [Online], Available: http://www.marcprensky.com/writing/Prensky%20-%20Digital%20Natives,%20Digital%20Immigrants%20-%20Part1.pdf, [March, 2008]