Digital skills, access and motivation to use e-services

Competencias digitales, acceso y motivación para usar e-servicios

Mayda Patricia González-Zabala [1], Ernesto Amaru Galvis-Lista [2],
Jenny Marcela Sánchez-Torres [3]

INFORMACIÓN DEL ARTICULO

ABSTRACT

This paper presents a study on digital skills, access and motivations to use or not e-services, made to students admitted to a technological career at the Universidad Distrital Francisco José de Caldas. The objective was to establish the previous knowledge in the digital area before beginning the education process offered by the university. A methodology proposed was: i) to determine the context, ii) data collection, and iii) reports generation and analysis of results. The main results obtained were: The characterization of the population under study, identify medium-high levels in the skills associated with knowledge of requirements for Internet access, search and use of online forms, and a medium-low level in recognition of secure environments to make transactions. In addition, it was found that 97% of the population access digital services because they are user-friendly, while distrust, lack of interest and ignorance about the digital service offer are the reasons that usually limit access. Regarding the use of services, 100% of the population use communication and entertainment services, 71.6% have used online training services, and 44.8% have searched for work online.

RESUMEN:

Este artículo presenta un estudio sobre competencias digitales, acceso y motivaciones para usar o no servicios digitales, realizado a estudiantes admitidos a una carrera tecnológica en la Universidad Distrital Francisco José de Caldas. El objetivo fue establecer los saberes previos en el área digital antes de comenzar el proceso de formación ofrecido por la universidad. La metodología propuesta fue: i) determinar el contexto, ii) recolección de datos, y iii) generación de reportes y análisis de resultados. Los principales resultados obtenidos fueron: la caracterización de la población en estudio, el identificar niveles medio- altos en las competencias asociadas al conocimiento de requerimientos para el acceso a Internet, realización de búsquedas y utilización de formularios en línea, y un nivel medio-bajo en el reconocimiento de entornos seguros para realizar transacciones. Además, se identificó que el 97% de la población accede a los servicios digitales por las facilidades que ofrecen, en cuanto que la desconfianza, el desinterés y el desconocimiento de la oferta son los motivos que más limitan el acceso. En cuanto al uso de servicios, el 100% de la población utiliza servicios de comunicación y entretenimiento, el 71,6%% ha utilizado servicios de formación en línea y el 44,8% ha buscado trabajo por Internet.

[1] BSc. In Systems Engineering, Universidad Industrial de Santander, Colombia. MSc. In Computer Science, Universidad Industrial de Santander, Colombia. Ph.D. In Engineering, Universidad Nacional de Colombia, Colombia. Current position: Professor at Universidad del Magdalena, Colombia. E-mail: mpgonzalez@unimagdalena.edu.co. ORCID: http://orcid.org/0000-0002-6847-7919.

[2] BSc. In Systems Engineering, Universidad Industrial de Santander, Colombia. MSc. In Computer Science, Universidad Industrial de Santander, Colombia. Ph.D. In Engineering, Universidad Nacional de Colombia, Colombia. Current position: Professor at Universidad del Magdalena, Colombia. E-mail: egalvis@unimagdalena.edu.co. ORCID: http://orcid.org/0000-0002-6012-668X.

[3] BSc. In Systems Engineering, Universidad Nacional de Colombia, Colombia. MSc. In Systems Engineering, Universidad Nacional de Colombia, Colombia. Ph.D. In Economics and Management of Innovation and Technology Policy, Universidad Autónoma de Madrid, Spain. Current position: Professor at Universidad Nacional de Colombia, Colombia. E-mail: jmsanchezt@unal.edu.co. ORCID: http://orcid.org/0000-0001-5284-836X.

1.   Introduction

The growth of Information and Communication Technologies - ICTs, especially the Internet, has brought a series of changes in all sectors of society. These changes are generating and creating new possibilities in how the things are done, from how to search information to the way of doing business, work, communicate, among others; revolutionizing the social, economic and cultural life worldwide [1]. Likewise, ICT have allowed new services to be spread in different sectors and areas of society. For example, the use of ICT in education has led to the development of e-learning, that is, education and learning from the distance, or teleworking that allows people to work remotely, just to name some examples [2]. The new context is called Information Society – IS [1-4], and its development brings new opportunities and challenges, that is why different countries and governments have proposed to develop it as a strategy to overcome social and economic gaps [2], [5-6].

Likewise, they have promoted the follow-up to the developed initiatives in order to guarantee that the economic objectives and social and inclusion development proposed in the IS are being achieved [7-8].

The IS represents a challenge to the education of new professionals as they are the ones called to support the development processes of society. In this sense, students and future professionals need to develop not only specific skills in their education area but also digital skills that allow them to access the IS easily and its benefits, making use of available digital services (e-services) [9-11].

According to the above, the research incubator Pegasus of the Faculty of Technology of the Universidad Distrital "Francisco José de Caldas" carried out an exploratory research, aimed at establishing digital skills, knowledge and use of the e-services and motivation to access them. This study was addressed to a group of students admitted to one of the technology's careers offered by the university, in order to build an image of their previous knowledge before they enter into the education process offered by the university.

It is important to highlight that this research explores to obtain tools to improve its educational offer, seeking with it a high social impact, a more significant insertion in the new social context, contributing to the progress of the city and the country [12]. The development of the research had the support of the Research and Development Group in Organizations, Systems and Technology - GIDOSC of the University of

Magdalena that developed an e-inclusion evaluation model, which includes the evaluation of the aspects proposed in the study [13]. Universidad del Magdalena has also developed similar studies [14-16].

This paper is composed of the following sections: the first section presents the conceptual framework of the research. Subsequently, the proposed methodology and the results are described. Finally, the conclusions and references that support this research are presented.

2.   Conceptual Framework

According to the theoretical review, digital skills and the motivation to access e-services have been identified, by the theories related to digital inequality and e-inclusion [17], such as: The ASA profile and the theory of the relative utility [18], the theory of the dimensions of digital inequalities [19], the framework of digital resources [20], the model of the four successive types of access [21-22] the Heuristic model of digital inequalities and inclusion / exclusion results [20], and the theory of the 5 skills of e-inclusion [23], as determining factors for the access of the population to the IS.

For this research, it is assumed that digital skills are associated with the use of technology, computers and the Internet, as well as the use of available digital services (e-services) [18-24]. For the selection of the digital skills involved in the research, the proposal of [13] was taken, which considered the guidelines of the Ministry of National Education – MEN [25], and the curricular proposal of the e- Citizen education program, [26]. Specifically, for the present study, the following groups of skills were considered [13]:

Skill 1- Knowledge requirements for Internet access. The knowledge of the requirements to connect a computer to the Internet, the structure of a web address and its difference with the email addresses are considered.

Skill 2- Knowledge on browsers and searches. It asks about: access to browsers, the recognition and use of hyperlinks, the use of search engines, the search by keywords and combination of criteria.

Skill 3- Use of online forms. The question of what an online form is, the entry of data in online forms and their download and send are considered.

Skill 4- Safety and risk on online transaction. The knowledge of safety risks, the recognition of spam and safe environments to make transactions are considered.

Moreover, the knowledge and use of e-services was considered to know what kind of activities are carried out, that is, how they participate in the IS [19-24], [27-31].

The proposal carried out by [13], was taken to evaluate user actions. This proposal analyses the participation considering the two first levels of maturity of Colombian "Gobierno en Línea" program [31], that is, informational, where user searches information to access e-services, and transactional, where the user fill forms and make online transactions. The research was focused on communication, education, entertainment and work fields. Finally, the motivation of the population to access e-services was analyzed. This motivation needs to be understood as aspects and point of views of the people to use (or not use) ICT, specifically internet and available e-services [18-24]. The motivations identified by [23] through field study were considered for this research. They are the followings:

Motivation to use e-services: user-friendly technology, obligation associated to the context which imposes the use of e-services and for safety to make transactions.

Reasons to no use the e-services: distrust of make transactions, lack of interest and knowledge related to the offer of available e-services, cultural aspects about preconceived ideas on technology, economic and technical reasons and lack of digital skills and knowledge of a second language, specifically English language.

3. Methodology

To address the research process, the process and tools designed by [13], to evaluate the e-inclusion in the Colombian context were used. This includes evaluation of digital skills, motivation to use the e-services and reason to not use them, as well as knowledge of the e-services offer and its use, among other aspects related to digital inclusion of the population. The assessment process includes the following three sequential stages:

To determine the context. The context of the research and the population are defined, as well as the sample. In this stage, the people in the sample are interviewed or surveyed. The information is associated with socio-economic features, digital skills, motivation, knowledge on service offer, and use of e-services. These data are compiled and tabulated in the formats and tools established [13].

Generation of reports and analysis. Finally, reports are generated that allow the data collected to be interpreted and the findings to be analyzed.

4. Results

After applying the methodology, the results obtained were the following:

4.1 Definition of the context

For this study, the work context was the Faculty of Technology of the Universidad Distrital, which is in the locality of Ciudad Bolívar in the city of Bogotá D.C. This zone is characterized by having sectors of limited economic resources and marginal neighborhoods. The locality was stated by the district authorities as a zone of high conflict. It is also characterized by having several social problems such as gangs and violent groups; the locality has one of the highest crime rates in Bogota [32]. For the research, a group of admitted students to study Industrial Technology in the 2013 first academic period was selected. The population was chosen by convenience sample, working with a sample of 67 students.

4.2 Data collection

The process of data collection was carried out in three sessions between February 12 and 14, 2013 at the Faculty's facilities. In each session the explanation of the purpose of the activity and instructions were given. The used formats were those designed by [13] and each student filled them. The expert group was supporting the activity. The duration of each session was approximately one hour.

4.3 Generation of reports and data analysis

Once data were collected, they were processed in the application designed by [13], which allows the generation of reports. Below are the main results obtained.

4.3.1 Characterization of the studied population

According to the data, it was found that 31.3% of the population was female and 68.7% was male. The population was between 11 and 25 years old and was distributed as follow: 89.5% in the range of 16 to 20 years, 9% in the range of 21 to 25 years and 1.5% in the range of 11 to 15 years. Regarding the marital status of the population, it was found that 94% of the population expressed being single, 4.5% were in a common-law marriage, and 1.5% did not provide information. The population in common-law marriage is in the age range of 16 to 20 years, 3% being women and 1.5%.

Regarding the previous education of the population, it was found that 70.1% of the population has completed

secondary education, 3% have an academic level of education, 25.4% have technical education and 1.5 % is a technologist. It is important to highlight that 95.5% of the population is exclusively student, and the remaining 4.5% of the population combines their studies with work activities (3% employees and 1.5% self-employed). Table 1 shows the distribution of the population concerning sex, age and previous education.

Age range	11 to 15 years		16 to 20 years		21 to 25 years		Total
Gender							
Education level	Feminine	Masculine	Feminine	Masculine	Feminine	Masculine	
Training			1,5%	1,5%			3,0%
Secondary education	1,5%		14,9%	47,8%	3,0%	3,0%	70,1%
Technical education			9,0%	13,4%	1,5%	1,5%	25,4%
Technologist				1,5%			1,5%
Total general	1,5%	0%	25,4%	64,2%	4,5%	4,5%	100,0%

Table 1. Distribution of the population according to sex, age and level of previous education. Source: own.

Likewise, conditions of vulnerability were identified, that is, conditions that by their nature or determined circumstances can expose the population to exclusion, poverty and the effects of inequality, and to all types of violence [33]. In this sense, it was found that 32.8% of the population state some condition of vulnerability. 17.9% of the population had some physical disability condition; 9% had food security problems (problems to obtain adequate nutrition); 1.5% of the population was female heads of household, that is to say, they are the people in charge of the sustenance of their family. The remaining 4.5% of the population belongs to groups minorities (3% Afro-descendants and 1.5% indigenous). Figure 1 shows the distribution of the population in relation to its vulnerability condition.
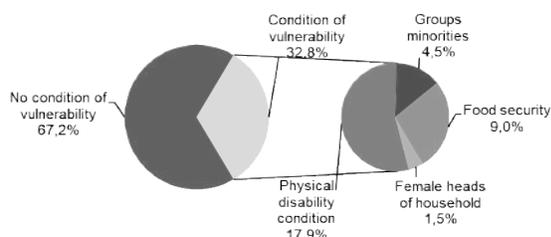
Figure 1. Distribution of the population under study by vulnerability. Source: own.

Regarding housing conditions, it was found that 60% of the population lives in a neighborhood which belongs to socioeconomic strata 2 ,4 22% in strata 3 and 18% in strata 1. Concerning the location of the house, it was found that 95.5% are in urban areas, 3% in rural areas and 1.5% in marginal urban areas. In terms of access to public utility needed for internet connection, such as electricity and telephone service, 100% of the population has access to these services, and it was found that everyone has access to ICT infrastructure, specifically to computers and the Internet.

4.3.2 Analysis of digital skills

Consequently, for the analysis of digital skills, as mentioned before, four established groups of skills were analyzed: Skill 1- Knowledge requirements for Internet access, Skill 2- Knowledge on browsers and searches, Skill 3- Use of online forms, and Skill 4- Security and risk in online transactions. To evaluate each one of the skills, five levels were defined, associated to the level of knowledge of each skill, which were determined by the percentage of affirmative answers obtained. The established levels were: from 81% to 100% (N1), from 51% to 80% (N2), from 21% to 50% (N3), from 1% to 20% (N4), and finally, the level N5 corresponding to no competition (0%).

According to the analyzed data, it was found that the population has a high and medium level (N1 and N2) in knowledge of Internet access requirements and the use of browsers and searches skills, which are basic and allow students to access information about digital products and services. It is highlighted that in these levels approximately 95% of the population is grouped. Regarding the use of online forms, it was found that the population was distributed across the five levels. About 85% of the population reported having high and medium levels (N1: 70.1% and N2: 14.9%); 3% of the population had a low average level (N3) and without skills (N5); and 9% of the population had a low level (N4).

The analysis of knowledge in security aspects and transaction risks skills showed that approximately 50% of the population in the study states that their level of knowledge was medium to low (from N2 to N5), showing greatest difficulty in detecting secure environments for transactions. Table 2 shows the distribution of the population with respect to the studied skills and established levels.

On the whole, in a deeper analysis, it was found that there was no difference between the population with vulnerability condition and those that did not have it. In the same way, the analysis by gender did not show significant differences, but it kept the percentage distribution between them.

On the other hand, with respect to the previous education, it was found that 100% of the people who said they did not have the skills associated with the use of browsers and searches (Co2), online forms (Co3) and

---

4 In Colombia, there are defined, by the government, six levels of socioeconomic strata: Level 1 and 2 are lower class; level 3 and 4 are middle class, and level 5 and 6 are upper class.

knowledge in aspects of security and risks (Co4) had secondary education, which is remarkable given that they were young people, recently graduated of secondary school.

Skills	N1 81% to 100%	N2 51% to 80%	N3 21% to 50%	N4 1% to 20%	N5 Without skills
Skill 1- Requirements to access to Internet	68,7%	29,9%	1,5%	0%	0%
Skill 2 – Use of browsers and searches	74,6%	17,9%	6,0%	0%	1,5%
Skill 3– Use of online forms	70,1%	14,9%	3,0%	9,0%	3,0%
Skill 4 – Security and risks of online transactions	53,7%	31,3%	11,9%	0%	3,0%

Table 2. Skills analyzed by skill levels. Source: own.

Likewise, it was found that approximately 20% of people with a technical education level reported low levels (N4 and N3) in using online forms skills, while 100% of technologists said they had same difficulties. With the above results, some weaknesses that may be in the education processes at these levels are shown, which may be due to the fact that the education focuses primarily on the aspects and specific areas of the field of knowledge, but not in the development of digital skills. The distribution described above is shown in Table 3.

Skill level	Skill	Training	Secondary education	Technical education	Technologist	Total per skill
N5: Without skills	No 2		1,5%			1,5%
	No 3		3,0%			3,0%
	No 4		3,0%			3,0%
N4: de 1% a 20%	No 3		4,5%	3,0%	1,5%	9,0%
N3: de 21% a 50%	No 1		1,5%			1,5%
	No 2		6,0%			6,0%
	No 3		1,5%	1,5%		3,0%
	No 4	1,5%	9,0%	1,5%		11,9%

Table 3. Distribution of the population with respect to the skill, skill level and the level of previous education. Source: own.

4.3.3 Knowledge and access to e-services

For the analysis about knowledge and access to e-services, it was inquired if the students searched information and made simple transactions in education, entertainment, communication and work fields. It is important to note that the research was carried out considering basic actions, for example: if you have searched for information or access to online courses.

When obtained data were analyzed, it was found that the knowledge and use of e-services in the communication field is 100%, that is, the population knows about the e-mail services, chats,

videoconferences, and makes use of some of them. Likewise, a high knowledge and use of education and entertainment services were shown, each with 98.5% in knowledge and use. In addition, it is highlighted that the studied population had a high level of knowledge of the services offer associated with work with 88.1%. On the other hand, in relation to the use of the services under study, it was found that the work field was the less used by the population, with 16.4%. Figure 2 shows the distribution regarding knowledge and use of e-services.
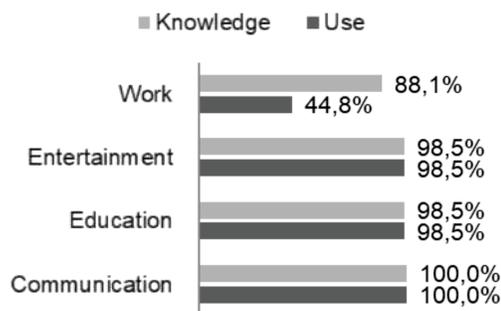
Figure 2. Distribution regarding knowledge and use of e-services by sector. Source: own.

For a more detailed analysis about the use of e-services, it was considered if the type of service was information or transaction. It is important to highlight that the population that perform transaction activities also make information search. The results of this analysis showed that 100% of the population used email and chats. In relation to entertainment, 97% of the population had downloaded music or videos, or listen online stations for entertainment and only 1.5% of the population had searched for information in this sector.

In relation to education, it was found that 26.9% of the population had sought information about educational offers and 71.6% of the population had taken some type of online education. Finally, it is highlighted that 100% of the population that used services in the work sector, they had looked for work, but none of them had been paid for an online work. In Figure 3 the described distribution is shown.
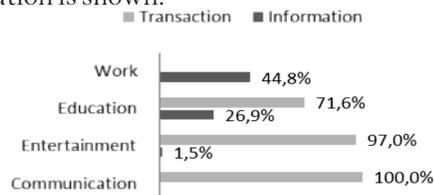
Figure 3. Distribution according to the type of use and the sector. Source: own.

4.3.4 *Analysis of motivational aspects for the use and non-use of e-services*

The fourth analysis was focused on identifying the reasons of the students to access and use e-services. The study showed that 97% of students access the Internet and the available services due to this technology is user-friendly. Likewise, 68.7% of the population said that they access because they must use this technology in the development of their activities. Finally, 23.9% of the population expressed that they use e-services because they consider it as a secure means to carry out their activities. Figure 4 shows the distribution regarding the reasons for using e-services.
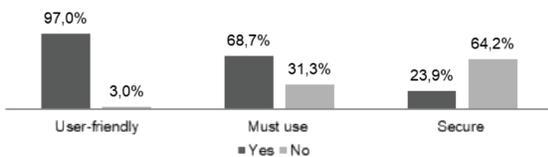

Figure 4. Distribution of the population regarding the reasons to use e-services. Source: own.

Later, the analysis was focused on identifying why population do not access e-services. The results showed that 73.1% of the studied population felt distrust when using e-services, since they consider services are not guaranteed, they may be scams, and they are not sure if the transactions are carried out correctly. The second reason found was the disinterest (64.2%) in using the available services, considering that they preferred to carry out their transactions personally. This can be understood as distrust of using the services.

Likewise, 47.8% of the population said that they do not know all the services and products to which they can access through the Internet, which limit the activities they carry out. Another reason found for non-use was the cultural aspect, 44.8% of the population indicated that accessing the Internet could cause dependency and damage interpersonal relationships. In relation to technical aspects, such as the availability of accessing the Internet, the quality of the service, the user-friendly features of the web pages that offered e-services, were factors that discourage its use; as well as economic aspects such as payment for Internet service or payment to access e-services or information, such as scientific journals. The technical and economic reasons were identified by 41.8% and 37.3% respectively. Finally, 34.3% of the population said that they do not access internet due to the lack of skills related to digital

aspects (browsing, complex searches, identification of secure environments, use of forms and online applications), and knowledge of a second language, mainly English. In Figure 5 below, the distribution described above is shown.
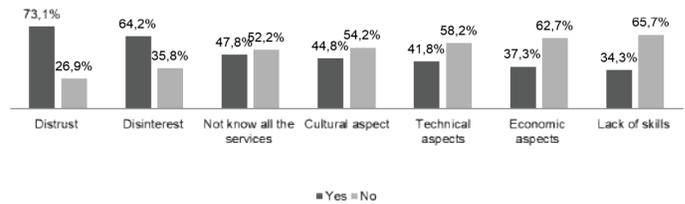

Figure 5. Distribution of the population regarding the reasons to NOT use e-services. Source: own.

5. Conclusions

The obtained results allowed to identify that the studied population are between 11 and 25 years, with minimum secondary education. Almost all population (approximately 96%) are dedicated exclusively to their studies. The entire population, regardless of their vulnerability condition, have access to public utility, as well as ICT infrastructure. The above can be the result of the country efforts to improve the internet access of the population. The analysis of the digital skills shows that the level of knowledge of the population on requirements to access the Internet, the use of browsers, the searches and the use of online forms is medium-high (from 51 to 100 %).

About the level found for the skills related to security and the identification of secure transactions was medium-low, which indicates that they must be reinforced so that the users increase their confidence in the use of e-services. Similarly, it was found that the levels of the population are acceptable, there are individuals who show problems to manage the studied skills. It is striking about previous education processes, since for more than 10 years computing education is compulsory in the secondary education. Concerning the knowledge of the eservices offer, it was found that population access to search information in the studied sectors. On the use of services, it was found that 100% of the population use entertainment and communication services to download videos, music, make video conferences, chats, among others. In the education field, it was found that 71.6% of the population have used online education services. This finding is important because it shows that part of the population requires education on how to use e-learning tool to support the development of ICT subjects. It was

also found that none of the students had accessed scientific databases, so training in this aspect would be needed to provide future students with access to the university's bibliographic materials. About the use of services in the work field, it was found that 44.8% of the population has searched for job opportunities through the Internet, but none of them has carried out any Internet activity that allows them to generate income. This result shows how population recognize the context of the IS. In general, the results show that population use the Internet to easily access information about services and products. It is important to highlight that the analysis was focused on four specific sectors at basic levels of information and transactions, then it is necessary to delve into the specific activities of each sector, and to expand the research to other fields and aspects of the IS.

The third analysis was focused on the identification of the motivations to access e-services. It was found that most of the population (97%) access because of its user-friendly features. However, 69% of the population expressed that they feel forced to use some services because the context imposes the use of some e-services such as a university or school paperwork (access to notes or assignments, enrollment, etc.). In addition, only 23.9% of the population accesses because they think is a secure environment. This result can be associated with the low level of skills in recognizing secure environments, so that if these skills are strengthened, the perception of online transaction process could be improved.

The analysis of the reasons for not using internet showed mistrust is the main cause, this result coincides with the findings of the analysis of digital skills and the low perception of security found in the reasons for use.

On the other hand, the high percentage of the population expressing they do not access internet due to the lack of interest in the services they know (64.2%), and the ignorance of other existing activities, products or services (47.8%) stand out. These reasons can be overcome if digital skills and knowledge of the e-services offer are strengthened. One alternative that can be managed from the university's education processes is to motivate the search and use of tools and services supported in ICT that have been developed for their career program.

Likewise, it was found that technical reasons for accessing to ICT infrastructure, problems to understand e-services, accessibility; as well as economic reasons associated with payment for use and access, lack of digital skills and the knowledge of a second language limit the access of the population.

In the context of the university, these disadvantages can be overcome by providing computer's rooms with free access to students and promoting the use of open source and creative commons tools. In addition, the student' skills need to be strengthened through tasks that encourage the use of ICT and the learning a second language, specifically English.

Also, it was found that 44.8% of the population stated that they have preventions with the use of e-services for cultural reasons, such as personal and work relationships can be dehumanized, and it can create dependency. This allowed us to conclude it is a topic that requires further study, through new studies that allow us to understand more about the implications of ICT in society.

In summary, the results allowed to obtain an image of the previous knowledge of the admitted students in one of the careers offered by the university. These results also let to identify the digital skills with most significant difficulty, the use of services in the education, entertainment, communication and work fields, and the reasons to use and non-use of e-services.

The above allowed to obtain information to strengthen the education processes offered by the university to its students. Finally, it is important to emphasize that the methodology and the instruments used allowed an adequate data collection, as well as the analysis of them. In addition, by doing this research in a known environment with secondary information allows validating the findings.

References

[1]   M. Castells, "La era de la información: Economía, Sociedad y Cultura", Madrid, España: Alianza Editorial, 2006.

[2]   J. M. Sánchez-Torres, M. P. González-Zabala and M. P. Sánchez-Muñoz, "La Sociedad de la Información: Génesis, Iniciativas, Concepto y su Relación con las TIC", *Revista UIS Ingenierías*, vol. 11, no. 1, 2012.

[3]   P. Bergonzelli and S. Colombo, "La Sociedad de la Información y el Conocimiento: implicancias para América Latina", 2006. [Online]. Available at:. http://www.eumed.net/ce/2006/pbsc.htm.

[4]   M. Becerra, "La sociedad de la información", Bogotá, Colombia: Grupo Editorial Norma, 2003.

[5]   J. E. Katz and R. E. Rice, "Social consequences of Internet use: access, involvement, and interaction", USA: MIT Press, 2002. https://doi.org/10.7551/mitpress/6292.001.0001.

[6]   CEPAL, "Las políticas de tecnología para escuelas en América Latina y el mundo: visiones y lecciones", 2007. [Online]. Available at: https://www.cepal.org/es/publicaciones/4006-politicas-tecnologia-escuelas-americalatina-mundo-visiones-lecciones.

[7]   WSIS, "Agenda de Túnez para la Sociedad de la Información", 2006. [Online]. Available at: https://www.itu.int/net/wsis/docs2/tunis/off/6rev1-es.html.

[8]   WSIS, "Compromiso de Túnez", 2006. [Online]. Available at: https://www.itu.int/net/wsis/docs2/tunis/off/7-es.html.

[9]   F. de A. Blas and J. Planells, "Retos actuales de la educación técnico-profesional", Madrid, España: Fundación Santillana, 2009.

[10]   M. Fandos, "El reto del cambio educativo: nuevos escenarios y modalidades de formación", *Educar*, vol. 38, 2006, pp. 243-258.

[11]   C. A. Martínez, "Un nuevo rol docente en la era de las nuevas tecnología", Cuadernos de Educación y Desarrollo, vol. 1, no. 1, 2009.

[12]   Universidad Distrital Francisco José de Caldas, "Plan Estratégico de Desarrollo 20072016", 2007. [Online]. Available at: http://planeacion.udistrital.edu.co:8080/planestrategico-de-desarrollo.

[13]   M. P. González-Zabala, "Propuesta de un modelo para evaluar la e-inclusión. El caso colombiano", 2013. [Online]. Available at: http://bdigital.unal.edu.co/45616/1/37545594.2013.pdf.

[14]   M. P. González-Zabala, E. A. Galvis and C. F. González, "Análisis de brecha digital en seis grupos poblacionales vulnerables de la región caribe colombiana", *Revista Virtual Católica del Norte*, vol. 39, 2013, pp. 33-46.

[15]   M. P. González-Zabala, E. A. Galvis, P. Vera, R. Aguas, y A. Hoyos, "Estudio sobre el uso de computador y el reconocimiento de la existencia de internet en una población vulnerable del caribe colombiano", *Revista UIS Ingenierías*, vol. 10, no. 2, 2011.

[16]   M. P. González-Zabala, C. F. González-Zabala and J. M. Sánchez-Torres, "Application of an evaluation model of e-inclusion for Colombian context: border zone case", International Conference on Information Society (i-Society 2013), Toronto, 2013.

[17]   P. Verdegem and P. Verhoest, "The "relative utility" approach for stimulating ICT acceptance: profiling the non-user", Proceedings of the IADIS International Conference e-Society 2008, Algarve, Portugal, 2008, pp. 154-161.

[18]   P. DiMaggio, E. Hargittai, C. Coral and S. Shafer, "Digital Inequality: From Unequal Access to Differentiated Use", 2004. [Online]. Available at: http://www.webuse.org/pdf/DiMaggioEtAl-DigitalInequality2004.pdf.

[19]   E. J. Helsper, "Digital Inclusion: An Analysis of Social Disadvantage and the Information Society", 2008. [Online]. Available at: http://eprints.lse.ac.uk/26938/.

[20]   J. Van Dijk, "The network society: social aspects of new media", London: SAGE Publications Ltd, 2006.

[21]   J. van Dijk and K. Hacker, "The Digital Divide as a Complex and Dynamic Phenomenon", The Information Society, vol. 19, no. 4, 2003, pp. 315-326.

[22]   Commission of the European Communities, "European i2010 initiative on e-Inclusion "To be part of the information society", 2007. [Online]. Available at: https://ec.europa.eu/digital-single-market/en/news/european-i2010-initiative-einclusion-be-part-information-society.

[23]   G. Bradbrook and F. Fisher, "Digital equality reviewing digital inclusion activity and mapping the way forwards", ScienceOpen, 2005.

[24]   Ministerio de Educación Nacional, "Estándares básicos de competencias en tecnología e informática", 2006. [Online]. Available at: http://www.colegionacionesunidasied.com/pdf/tecno.pdf.

[25]   The European Computer Driving, "e-Citizen Syllabus Version 1.0", 2006. [Online]. Available at: http://www.ecdl.si/uploads/files/ucni_nacrt_ecitizen.pdf.

[26]   E. M. Rogers, "Diffusion of Innovations", New York: The Free Press, 2003.

[27]   S. Molnár, "The explanation frame of the digital divide", 2003. [Online]. Available at: https://www.academia.edu/1308255/The_explanation_frame_of_the_digital_divide.

[28]   D. Miller, "Acknowledging consumption: a review of new studies" Psychology Press, 1995.

[29]   J. Fiske, "Understanding Popular Culture", Taylor & Francis, 2010.

[30]   R. Williams and D. Edge, "The social shaping of technology", *Research Policy*, vol. 25, no. 6, 1996, pp. 865-899. https://doi.org/10.1016/0048-7333(96)00885-2.

[31]   Ministerio de Tecnologías de la Información y las Comunicaciones, "Manual 3.0 para la implementación de la estrategia de gobierno en línea en las entidades del orden nacional de la República de Colombia", 2011. [Online]. Available at: http://viejoprograma.gobiernoenlinea.gov.co/apc-aafiles/Presentaciones/Manual_GEL_V3_0_VF.pdf.

[32]   ContagioRadio, "Ciudad Bolívar, la localidad de Bogotá con mayor número de 'exterminio social'", 2009. [Online]. Available at: http://www.contagioradio.com/limpieza-social-una-muestra-de-la-degradacion-de-laguerra-en-colombia-articulo-22940/.

[33]   Ministerio de Educación Nacional. República de Colombia, "Lineamientos de política para la atención educativa a población vulnerable", 2006. [Online]. Available at: https://www.mineducacion.gov.co/1759/w3-article-90668.html.