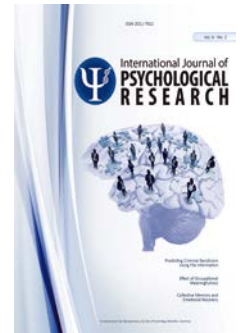




Study about ICT skills in junior high school teachers under Mexico's educational reform

Estudio sobre competencias en Tics en profesores de secundaria bajo la reforma educativa en México



Research

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ABSTRACT

This study sought to identify the management that junior high school teacher in Mexico gives to Information and Communication Technologies (ICT) as well as their attitudes and uses of digital devices, particularly in the framework of secondary school reform, using an instrument based on the ICT Competency Standards for Teachers (UNESCO, 2008), led to 350 teachers in four municipalities of Nuevo Leon, Mexico selected through random sampling for a confidence level of 95 to 5 error and probability .05, of a universe of the metropolitan area of Monterrey. The results indicate that when digital communication is more used, it is more likely also its integration in in the classroom. At the end, it was found the level of ICT knowledge of teachers in an instrumental phase as well, which should lead to change teaching practice and public policy in this area.

Key Words:

Information and Communication Technology, Teacher Training, Basic Education, Teaching skills, Educational Reform in Mexico

RESUMEN

El objetivo de estudio buscó identificar el empleo que da el docente de secundaria en México, a las tecnologías de la información y la comunicación (TIC), así como sus actitudes y usos de mecanismos digitales, todo en el marco de la reforma en secundaria. Se utilizó un instrumento basado en los Estándares de Competencias en TIC para Docentes (UNESCO, 2008), dirigido a una muestra de 350 profesores de cuatro municipios de Nuevo León, México seleccionados a través de un muestreo aleatorio para un nivel de confiabilidad de 95 al 5 de error y probabilidad .05, de un universo de la zona metropolitana de Monterrey. Los resultados indican que a mayor empleo de la comunicación digital, existen más posibilidades de su uso en aula, además de encontrar en fase instrumental el nivel de conocimiento en TIC de los maestros, situaciones que deben llevar a modificar la práctica didáctica y las políticas públicas en este rubro.

Palabras Clave:

Tecnología de la Información y Comunicación, Formación Docente, Educación Básica, Competencias docentes, Reforma Educativa en México

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1. INTRODUCTION

Currently, information has become an important base of our society since it is determining to make economic, political, and social decisions. For this reason, the educational system aims to educate young people who are able to be part suitably of the labor world, which involves reforms in the different educational levels.

Such is the case of high school education in Mexico which has had slow and disjointed changes (López & Angulo, 2006; Sandoval, 2007). The last of them was the one published in the 384 federation's official newspapers agreement on 26 May 2006. It proposes some actions related to ICT such as: 1) Development of an information program, training and advice; 2) Creation of a national system of professional development and updating; 3) Technology inclusion as a subject in the national curriculum. This reform has as its aim the coverage of students, dropping out, and the large number of groups that a teacher has, just to name few of them (Zorrilla, 2004).

1.1. Status of the issue

The topic about ICT teaching training is one of the main matters to analyze due to the importance and the impact of this kind of studies, the economic deposit that these actions entail, and the lacking use that ICT have in the classroom because of the teacher (Sabulsky & Forestello, 2009; Sancho, Ornelas, Sánchez, Alonso, & Bosco, 2008).

Coll, Mauri, and Onrubia (2008) studied several cases in order to identify, describe and analyze the ICT uses of teachers, which led to the conclusion the less common use involves the configuration of learning environments and work spaces for teachers and students, which shows the limited use of these means and is consistent with Kafyulilo and Keengwe (2013) research in two high schools in Tanzania who also identified that teachers use it mainly for administrative purposes.

Another important study was conducted by Ricoy and Cuoto (2011) who studied with high school teachers of mathematics the use they give of ICT, identifying digital means that involves advantages and disadvantages. This research was qualitative, descriptive and interpretative. Results show that teachers with few years of service have ICT knowledge that was acquired in their professional training. The most used digital resources were the internet and the mathematical software, whereas interactive programs, emulator of graphic calculator, Word, PowerPoint, Excel,

blogs, wikis, podcast, web quests, forums, social networks, and databases were few mentioned.

On the other hand, Gargallo, Suárez and Almerich (2006) studied attitude influence on new technologies integrations in the classroom; they specified teachers' profiles and analyzed the incidence rate of their use of ICT. They worked in 79 high schools with a representative sample of 2,311 students and 492 teachers. Results show that teachers with a better attitudinal profile make an intense and effective use of internet for personal and school matters.

However, despite the results of Gallardo et al., Agyei and Voogt (2011), who investigated the use of ICT in mathematics teachers, found that the 96% of them have disposition to integrate it in the classroom (p. 433). In spite of this, most of the teachers continue using traditional tools to teach, which could be attributed to the lacking capacitation to integrate ICT or to the few skills to use them, especially in regards to older educators (p. 432-433), which is in accordance with Wikan and Molster (2011) who research how often high school teachers use ICT and how they implement them in teaching processes, finding that just 22% of the teachers usually use them (p. 217).

Furthermore, Pelgrum and Voogt (2009) devised some constructs that characterize change behaviors in order to analyze issues that affect the application of ICT in teaching processes. In teachers' case, it is related to the techniques and pedagogical competences, their vision and availability, and others (p.3), which is similar to the findings of Salleh and Laxman (2013) who carried out a study about the influence factors in the use of ICT by high school teachers finding that personal attitudes, social factors and self-conception about technology are the most influential (p.13).

In respect of the needs about teaching training, Tejedor and García-Valcárcel (2006) analyzed the incidental dimensions and the obstacles, based on the interview carried out in Castilla & León with a random sample to the 23% of the population. Results showed that teachers know about basic computer applications while they have lacking presentation and application elaboration of multimedia focused on teaching. Another interesting fact is that younger teachers are those with higher level of digital competence.

The assessment of high school curriculum reform in Mexico 2006 analyzed teaching practices taking a representative sample of 314 schools. Questionnaires about professional training, workplace, experience and opinion about update programs and its

effects were applied to teachers. 52.2% of them and 46.5% directors agreed on the failure of equipment to support the teaching process according to the reform (Rothman & Nugroho, 2010). In summary, the data obtained from the research shows that young teachers are more motivated to use ICT into the basic learning process. According to this, the problem proposed is about the mechanisms through which the teacher is alphabetized digitally and how this knowledge is integrated to improve educational achievements.

With the purpose of analyzing this situation, it was taking again the Modules of Standards by the United Nations Educational Scientific and Cultural Organization –UNESCO– (2008), which suggests educating students as objective, citizen and workers that can understand digital technologies to support social development and improve economic productivity. It should be mentioned that it is an instrument taken from a research taking place in another context (Vera & Torres, 2012).

1.2. Study objectives

The aim is to study the employment level of information and communication technology in high school teachers and also their attitudes towards digital mechanisms. All of these in the framework of high schools reform in the metropolitan city of Monterrey.

2. METHOD

2.1. Participants description

Participants are high school teachers in the metropolitan area of Nuevo León in Mexico. They are 188 women and 162 men of different training areas who represent the 4.85% of teacher's population in this region (Ministry of Public Education, 2011).

2.2. Procedure

It was carried out a qualitative and non-correlative experimental analysis relating knowledge and attitudes according to the academic profile, age, and sex of a population of 3,580 high school teachers working in the metropolitan zone of Monterrey city in 2010. For this purpose, it was used a chart developed by Tagliacarne (1968) for finite populations with a \pm two standard deviations error limit and 5% for a probability of 50/50 and a confidence interval of 95,5% that is equal to two sigmas (Sierra Bravo, 1985), which generated a sample of 350 educator who participated in the measurement.

Each one of the sample elements were chosen randomly.

2.3. Measurement characteristics

The designed instrument with a total of 114 reactive elements was developed under the UNESCO guidelines (2008) and accepted by judges' criterion. It is partially based on the measurement developed by the Canarias government through its Education council (Instituto Canario de Evaluación y Calidad Educativa, 2004). Vera and Torres (2012) carried out the validation for measurement construct finding an explained variance of 65.9 and a reliability of .92 for the total scale (Vera & Torres, 2012).

The measurement is composed by two variables: Skills Evaluation and Digital Attitude, which are used to try to identify the teacher perception regarding the ICT utilization in the classroom. Using the measurement of Vera and Torres (2012), they were found very suitable inter-correlations for our study in each dimension, and it is shown in the table 1 as well as the content of each one.

2.4. Sample characteristics

The teachers sample has the following characteristics: 68% of the interviewees are 40 years old or older while 32% are between 20 and 30 years old. In regards to the training, 42,8% have a specific training to teach in high schools, which is called Normal Superior in Mexico; 36 % have a first degree; 20.3% have master's degrees; and .9% get higher degrees. 41.7% of the teachers are assigned to state schools and 58.3% to federal ones¹ (see table 2) 42% of the sample was full time teachers or educators with indefinite contract and 58% had specific courses contract. Besides, they have said that in relation to internet access, it occurs at home the 64.3%, and in the educational institution the 6.4%, the remainder percentage refers to other options. They also argue that the ICT advantages in the teaching/learning process are nothing or low (28%), regular (34%), many (25.4%), or enough (12.6%). Regarding the labor experience, 41.4% has between 0 and 12 years of service, the 35.2% between 13 and 24, the 21.9% between 25 and 36, and the 1.5 more than 37 years of experience.

3. RESULTS

¹ Federal institutions have programs supported by the central government, whereas state institutions are supported by each federation of Mexico

The table 3 makes evidence that the higher values of difference were found in the hardware use followed by software use, which are the most important ones associated to the computer, internet and e-mail use.

Those who use e-mails, internet and word processors more than 4 times at the week obtain software and hardware use means higher that those who reported a minor or equal frequency to 3 times per week.

Table 1. Description of the measurement used in the study directed to ICT use of high school teachers in Mexico

		No. of reactive elements	Cronbach's alpha	Reactive elements definition
SKILLS EVALUATION VARIABLE				
Dimensions	Hardware-operating system	21	0.96	Teachers' perception of computer skills competency.
	Software	14	0.74	Teachers' perception about the use of image processing, multimedia creation, graphics and calculations tools, and data bases.
	Educational application	14	0.92	Technology applied in the classroom with aspects such as didactic planning and educational material production.
DIGITAL ATTITUDE VARIABLE				
Dimensions	Digital communications systems	10	0.88	Teacher attitudes about digital systems.
	Internet	10	0.88	Teacher attitudes about internet use
	Social networks	10	0.92	Teachers' perception about social networks.
	Computer use in the work place	10	0.89	Teachers' attitudes about ICT use in the learning-teaching processes.
	Computer use in the classroom	10	0.91	Teachers' attitude about the computer use in the classroom.

Table 2. Description of the teachers sample characteristics for a study about ICT uses

Age	s	Edu	s	S	N	Experience	s	Contract type	School type
20-29	43	N	150	M	162	0-12	141	Full-time	147 State 146
30-39	69	Fi	126	F	188	13-24	119	Specific courses	203 Federal 204
40-49	117	M	71			26-36	76		
50 y más	121	H	3			37-48	5		

Note: s= Sample, Edu= Education, S=sex, N= Normal Superior, Fi=First degree, M= Master degree, H=High degree.

The difference evidenced is associated with internet; it seems that the equipment used is related to the use and frequency of internet per week. It was expected that the use of internet as the most relevant variable was into the total competency about hardware, software, and educational application.

Even when the differences are not significant in most of the parameters, the application and didactic use to constantly improve learning processes have the lower values, which indicates that high school teachers

interviewed are inside an instrumental phase of their competences development.

It could be inferred from the table 4 that the effects of some teachers' attributes, such as the school type, have more implications in the hardware or software use. Thus, policies, and state strategies and inversions are relevance for their institutions. It seems that it is more commendable the federal inversion than the state one. However, in no case the skills application of software and hardware affects the didactic field since the Student's T values are incipient.

Table 3. Student's T analysis using as factor the use frequency of different elements of hardware and software about Skills Dimensions and ICT use Knowledge

Use frequency:	Hardware use			Educational application		Software use		Total competency	
	n	\bar{X}	t	\bar{X}	t	\bar{X}	t	\bar{X}	t
PC									
0 to 3 times per week	236	3.23	-6.08***	2.69	-5.74***	3.02	-5.53***	3.01	-6.30***
More than 4 times per week	114	4.00		3.38		3.80		3.76	
Processor									
0 to 3 times per week	236	3.11	-11.04***	2.64	-8.18***	2.88	-10.59***	2.91	-11.23***
More than 4 times per week	114	4.31		3.54		4.17		4.03	
E-mail									
0 to 3 times per week	236	2.81	-12.15***	2.44	-9.27***	2.61	-10.90***	2.65	-12.08***
More than 4 times per week	114	4.18		3.41		3.97		3.89	
Calculus program									
0 to 3 times per week	236	3.37	-7.16***	2.82	-5.02***	3.14	-8.56***	3.15	-8.40***
More than 4 times per week	114	4.45		3.77		4.44		4.23	
Internet									
0 to 3 times per week	236	2.66	-13.98***	2.37	-9.80***	2.46	-12.44***	2.52	-13.58***
More than 4 times per week	114	4.20		3.39		3.98		3.90	

*p≤.05**p≤.01***p≤.001

A second variable is the contract type; teachers with one of specific courses show always the same perception about didactic applications in the

classroom and software and hardware use, which is higher in comparison with full-time teachers.



In regards to attitudes, it is presented in the table 5 the contrast of hypothesis for the digital attitude dimension, it is possible to observe in the five dimensions that the values of Student's t are higher

than 6 in none of the cases. In this context the most relevant variables for the use parameters of ICT are the e-mail and internet use.

Table 4. Student's T analysis using the Variable Attribute as factor and the Skills and Knowledge dimensions about ICT use as variable.

Use frequency:	Hardware use			Educational application		Software use		Total competency	
	n	\bar{X}	t	\bar{X}	t	\bar{X}	t	\bar{X}	t
School shift									
Morning	222	3.62	2.80	3.02	2.51*	3.46	3.40***	3.40	3.08
Afternoon	128	3.23		2.72		2.95		3.01	
Sex									
Male	162	3.42	-.77	2.84	-1.15	3.26	-.16	3.21	-.75
Female	188	3.53		2.98		3.28		3.30	
School type									
State	146	3.12	-4.52***	2.72	-2.83	2.83	-5.27***	2.93	-4.50***
Federal	204	3.74		3.05		3.59		3.49	
Contract type									
Full-time/indefinite	138	3.15	-3.93***	2.73	-2.34*	2.94	-3.57***	2.97	-3.66***
Specific courses	203	3.69		3.01		3.47		3.43	

*p≤.05 **p≤.01***p≤.001

The attitudes regarding internet are those that are associated in a most important way with the use of e-mails, computers, and word processors. Nevertheless, not a single factor is significant in respect to attitudes about computer's use in the classroom.

In relation to the attributes that resulted significant (see table 6), it is possible to observe that only the contract type obtains significant T values for use frequency in respect to internet. Assigned school and teacher genre are not found as a variable that establishes difference in the attitudes dimensions regarding ICT utilization.

The attitudes present very basic differences, and most of them were only 0.5 significant, which indicates that, generally, factors do not modify considerably the dimensions. In respect to the simple variance analysis focused on the skills evaluation (see table 7) about the category of courses they teach, the highest variance was found in hardware use, which can be interpreted as a population with higher skills about this aspect than software and educational application.

In relation to teachers' ages, their variances were very high and it is possible to confirm that it is a determinant factor in ICT skills since the higher Medias during the statistical analysis belong to 20 to 29 years old educators, which was pointed by different analyzed authors.

Regarding the variable, ICT facilitates the learning-teaching process. The variance was small as much to Software as to Hardware, 4.93 and 7.07, whereas the one of Educational application is 17.67, which indicates the teacher skills about the equipment use, but the lack of application in the classroom as well. In relation to the Use based on interests, the variances are very high and show the poor impact about ICT uses in each dimension.

Table 8 indicates the variance analysis result for Digital Attitude where the factor (course he/she teaches) does not produce a significant difference in the respective dimensions, which is observed in the variances. Whereas, teachers ages have a higher impact about internet and social networks uses, especially in the group of 20 to 29 years old educators.

Table 5. Student's *t* analysis using use frequency of Hardware and Software as factor about the dimensions of the Digital Attitude Variable

Categories	<i>n</i>	Digital Communication System		Internet		Social Network		Computer use in the work place		Computer use in the classroom	
		\bar{X}	<i>t</i>	\bar{X}	<i>t</i>	\bar{X}	<i>t</i>	\bar{X}	<i>t</i>	\bar{X}	<i>t</i>
Use of computer for academic purposes											
0 to 3 times per week	236	4.89	-2.37*	5.59	-4.67***	4.18	-2.81	5.63	-3.88***	5.88	-.86
More than 4 times per week	114	5.28		6.13		4.67		6.10		5.99	
Use of word processors											
0 to 3 times per week	243	4.88	-2.67	5.60	-4.83***	4.20	-2.60*	5.65	-3.52***	5.86	-1.40
More than 4 times per week	107	5.33		6.16		4.66		6.09		6.04	
Use of e-mail											
0 to 3 times per week	179	4.74	-3.68***	5.44	-5.65***	3.99	-4.35***	5.48	-5.08***	5.83	-1.46
More than 4 times per week	171	5.30		6.11		4.70		6.10		6.00	
Use of Excel											
0 to 3 times per week	315	5.01	-.39	5.74	-1.56	4.31	-.86	5.78	.05	5.92	.42
More than 4 times per week	35	5.11		6.06		4.55		5.77		5.84	
Use of Word Wide Web											
0 to 3 times per week	163	4.73	-3.52***	5.39	-5.73***	4.04	-3.34***	5.40	-5.65***	5.82	-1.44
More than 4 times per week	187	5.27		6.09		4.59		6.12		6.00	

*p≤.05 **p≤.01***p≤.001

Table 6. Student *T* analysis using the Variables of Attribute and the dimensions of Digital Variable as factor.

Categories		Digital Communication System		Internet		Social networks		Computer use in the work place		Computer use in the classroom		
		<i>n</i>	\bar{X}	<i>t</i>	\bar{X}	<i>t</i>	\bar{X}	<i>t</i>	\bar{X}	<i>t</i>	\bar{X}	<i>t</i>
Sex	Male	162	5.15	1.56	5.94	2.58*	4.44	1.18	5.95	2.38*	6.01	1.51
	Female	188	4.91		5.62		4.25		5.64		5.83	
School type	State	146	4.86	-1.65	5.60	-2.27*	4.18	-1.61	5.67	-1.49	5.70	-2.91
	Federal	204	5.13		5.89		4.45		5.86		6.07	
Contract type	Fulltime-indefinite	138	5.01	.06	5.77	.04	4.31	-.27	5.80	-.27	5.84	-.93
	Specific courses	203	5.00		5.77		4.36		5.77		5.96	

*p≤.05 **p≤.01***p≤.001



Teachers' education does not present significant contrasts, opposed to years of experience and adoption based on interests that were statistically more meaningful. The ICT use in the learning-teaching process as a factor had a significance level of .05 for

the internet and PC use in the educative institution variable. Whereas adoption based on interests got a critical level of .001, which indicates the importance of this skill perception in the attitudes about ICT.

Table 7. Simple variance analysis for Skills Evaluation Variable and Attribute Variables as factors.

Categories		n	Hardware-operating system		Software		Educational application	
			Mean	F	Mean	F	Mean	F
Course he/she teaches	Exact sciences	109	3.53	3.15 *	3.38	2.56 *	2.98	2.03
	Humans sciences	84	3.21		2.97		2.72	
	Languages	90	3.76		3.50		3.10	
	Others	64	3.35		3.18		2.82	
Teacher age	20-29	43	4.34	24.66 ***	4.22	24.08 ***	3.52	14.35 ***
	30-39	69	4.10		3.91		3.30	
	40-49	117	3.40		3.18		2.90	
	50 and more	119	2.91		2.67		2.50	
Teachers' education	First degree	273	3.46	.11	3.25	.23	2.89	.27
	Postgraduate studies	74	3.52		3.34		2.97	
Experience	to 10 years	128	3.93	14.47 ***	3.73	12.40 ***	3.23	8.87 ***
	11 to 20 years	84	3.34		3.10		2.79	
	More than 21 years	138	3.15		2.95		2.70	
ICT advantages for l-t processes	Nothing	84	3.21	7.07 ***	3.04	4.93 **	2.59	17.67 ***
	Little	119	3.36		3.17		2.73	
	Quite	136	3.80		3.58		3.35	
Adoption based on interests	Basic	172	2.79	79.84 ***	2.55	76.38 ***	2.33	76.46 ***
	Mechanical	81	3.87		3.63		3.15	
	Complex	97	4.38		4.27		3.74	

*p≤.05 **p≤.01***p≤.001

Table 8. Simple variance analysis for Digital Attitude Variable and Attribute Variable as factor

Categories	n	Digital Communication Systems		Internet		Social networks		Computer use in the work place		Computer use in the classroom		Total variable	
		Mean	F	Mean	F	Mean	F	Mean	F	Mean	F	Mean	F
Course he/she teaches													
Exact sciences	109	4.98	.04	5.82	.69	4.54	1.72	5.88	.72	5.84	.77	5.41	.36
Human sciences	84	5.00		5.67		4.35		5.69		5.82		5.31	
Languages	90	5.04		5.87		4.35		5.83		5.96		5.41	
Others	64	5.04		5.66		3.99		5.64		6.07		5.28	
Teachers' age													
20-29	43	5.12	.30	6.00	1.46	4.62	1.42	5.91	.97	5.83	.12	5.50	.64
30-39	69	5.01		5.92		4.55		5.88		5.94		5.46	
40-49	117	5.08		5.72		4.25		5.64		5.95		5.33	
50 and more	119	4.93		5.65		4.19		5.85		5.91		5.30	
Teachers' education													
First degree	273	5.06	1.48	5.74	.38	4.41	3.40	5.76	.40	5.95	1.48	5.38	.79
postgraduate studies	74	4.83		5.84		4.03		5.86		5.77		5.26	
Experience													
0 a 10	128	5.20	1.90	5.98	3.49*	4.65	4.43*	5.98	3.10*	6.04	1.31	5.57	4.28*
11 a 20	84	5.01		5.71		4.06		5.76		5.84		5.28	
More than 21	138	4.85		5.61		4.22		5.62		5.83		5.23	
ICT advantages for l-t processes													
Nothing	84	4.74	2.59	5.62	3.80*	4.15	1.06	5.62	5.40*	5.79	1.18	5.18	3.77*
Little	119	5.03		5.64		4.33		5.65		5.89		5.31	
Quite	133	5.20		5.99		4.46		6.07		6.03		5.55	
Adoption based on interests													
Basic	172	4.84	6.81***	5.48	11.51***	4.21	4.26*	5.47	13.53***	5.84	.84	5.17	8.73***
Mechanical	81	4.86		5.92		4.15		5.95		6.04		5.38	
Complex	97	5.47		6.14		4.72		6.21		5.93		5.69	

*p≤.05 **p≤.01***p≤.00

4. DISCUSSION

Thanks to the data interpretation, it is possible to observe that teachers have more elements to generalize and use their knowledge about ICT in the school field when there is a higher use of e-mails, internet and word processors.

The aforementioned depicts a challenge for Mexico since according to the research published by the [Public Education Ministry of Mexico \(2009\)](#), where 6,645 schools, 62,650 teachers and 5,645 principals were studied, 75,8% of the principal interviewed stated there was an obstacle for teaching due to the lack of computers, which produces that teachers and students do not use them routinely . That is why it should be kept



in mind to create innovative public policies that provide conditions and equips of ICT use in the academic context for schools.

Another relevant result involves the trouble to implement application and didactic use of ICT since high school teachers interviewed are in an instrumental phase of competences development, which is confirmed by Pedró (2011), Domingo and Marqués (2011), and Suárez, Almerich, Díaz and Fernández (2012), who mentioned technology as the element teachers used in activities outside the classroom and required basic knowledge, which is away from innovative learning settings.

Besides, results show that teachers of specific courses present always a higher perception of hardware and software use and didactic application in the classroom in terms of score than other ones. It could happen because the younger they are, the higher is the ICT use since they are part of generations related to these processes, as it was demonstrated by Tejedor and García-Valcárcel (2005).

In the case of attitudes about digital communication systems, internet, social networks, and computer use in the educative institution, an instrumental subjective perception prevails, which agrees with the study carried out by Ramírez, Cañedo and Clemente (2012), in which the use frequency of internet and email use does not impact the attitude of computer use in the classes, which should lead to think not only about the necessity of equipping classrooms with technology, but developing different didactic processes that allow other results and academic practice of ICT use being valuable and interesting for both teachers and students.

It should be mentioned despite the fact that there are studies indicating how teachers age is the higher impact regarding internet and social networks uses, specially the group of 20 to 29 years old educators (Ramírez et al., 2012), in this research was found that it does not affect results obtained in the classroom. Thus, teachers ages and internet or social networks skills do not mean ICT skills to implement them in the classroom as it is said by Suárez, Almerich, Gallardo and Aliaga (2013) in an investigation carried out with elementary and high school teachers.

5. CONCLUSIONS

The reform for high school is a challenge for the teacher since it involves ICT to use them in the classroom as a tool to produce meaningful learning experiences that lead students to go beyond, which

involves adopting new work schemas and a structure of training and advisers that allows having support to implement a different educational practice (Gutiérrez, 2008).

Reality shows that this study allows identifying some of the biggest challenges to achieve a transformation in the basic level institutions: didactic practices changes (Area, Cepeda, González, & Sanabria, 2010), general perceptions about ICT (Almerich, Suárez, Jornet, & Orellana, 2011), higher numbers of equipments and internet coverage, governmental policies for equity, and strategies that carry ICT to society as a source of labor training and culture i.e, the reform for high schools has a clear objective and the processes of training and equipping should be carried out together to create a digital culture that not only educate at the school, but influences community and becomes an innovative option that allows involving students in an information and knowledge society as the current one.

It is important to raise conception lines of knowledge about this matter that allow generalize successful experiences, identifying the needs of each context, and knowing in detail the teachers identity regarding ICT, its reaches, and its limitations. Besides, it is necessary to promote new technologies use in a suitable way for the learning processes associated with the reform that is based on a competences model. It is also needed researching about digital skills of students and their relation with teacher competences.

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