Principals' Perceptions of the Process of Integration of ICT in Public Primary Schools in Veracruz

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Abstract

The present is a report on the results of a descriptive study made using quantitative methodology. The objective was to describe the attitude the principals of public primary schools in Veracruz, Mexico had in relation to the integration of Information and Communication Technology (ICT) in their schools. Probabilistic representative sampling of 214 public primary schools and sampling of 46 schools was used. The results indicate that the principals believe that ICT is applicable to their managerial work and insertion in educational didactics. Although the principals have a positive attitude towards ICT in the educational process, it is used little in public primary schools in Veracruz as can be perceived by the scarcity of computers and related equipment; complete lack of planning for maintenance, up-dating and operation of the technological infrastructure; and the lack of technological and pedagogic training of the teachers.

Keywords: Attitude, Use of ITC, Teachers, Principals, Public Primary Education, Mexico

1. Introduction

Incorporating Information and Communication Technology (ICT) has an ever increasing bearing on the daily lives of more and more people around the globe. According to Fernández-Tilve (2007) ICT can be instruments at the service of teaching in many and varied ways in various pedagogical formulas and tools, related both to hardware and communication means, such as programs and solutions for users.

However, the incorporation of ICT in education presents a challenge to traditional concepts of teaching and learning (López de la Madrid & Chávez, 2013), no matter what level of education we are talking about. The application of these technologies in the classroom redefines the way in which knowledge is constructed. Its value has been acknowledged in literature but its full potential has not yet been reached.

Studies which have been carried out (Area, Cepeda, González &Sanabria, 2010) show that, despite the increase in technological resources in schools, this does not necessarily imply fundamental changes in teachers' traditional pedagogic practices in the classroom.

In Mexico there have been attempts at integrating technological resources through the Enciclomedia program with less than satisfactory results from the perspective of students, teachers and administrators (Martínez, Ortega, Quesada & Sánchez, 2010). More recently by means of the federal government's program, micompu.mx personal computers or tablets were given to students in the final years of primary schools in three states of the Mexican Republic(in the initial stage), in order to breach the digital gap and provide students with technological literacy (Secretaría de EducaciónPública [Ministry of Public Education] [SEP], 2013).

Various authors (Fernández, Rodríguez & Vidal, 2007; Fernández, Hinojo& Aznar, 2002; Tejedor&García-Valcárcel, 2006) believe the attitude teachers have towards the use of ICT is one of the factors which may help explain the problems found when its incorporation into the system is attempted. This information may be used in developing programs aimed at promoting the effective use of ICT by teachers from the beginning of their formal training onwards.

Teachers play a determining role in the results of any educational reform and the programs to introduce the use of ICT into schools are no exception. Teachers need to have the competency and attitude necessary for allowing the reforms to modify their practices. Thus, it is through an understanding of what happens in the classroom in the face of the use of ICT that the path for the correct incorporation of these technological tools will be found. Understanding teachers' attitudes is precisely one of the key elements in the process of adopting and integrating ICT into the classroom.

The one thing that all studies in Mexico have in common has to do with one of the key actors in the educational process, the teacher. However, there has not been any in-depth literature on the role played by another key actor, the school principal. In this respect, the present paper hopes to shed some light on the perceptions, assessments and feelings of this educational actor based on the premise that principals are teachers who, at least during their time as principals, do not teach in the classroom.

2. The Concept of Attitude

The concept of attitude has traditionally been defined as a disposition (Skehan, 1989; Morales, 1988; Pérez &García, 1989) to react favorably or unfavorably to an object, situation or event. Attitude is a predisposition to action; a learned, non-innate predisposition (Guitart 2002; Prat &Soler, 2003), stable but prone to change, to an evaluative reaction towards an object, which implies a clear tie with the action to be carried out (Gairín 1990; Prat &Soler 2003).

On the other hand, attitudes, like other affective variables and like the learning process itself, are not static, but rather vary and may be altered or modified throughout time, influenced by people, experiences and contexts (Herdina&Jessner, 2002; Adegbija, 1994). Attitudes, along with one's personality, motivation, expectations, socio-cultural experiences or anxiety, make up the so-called affective variables of learning (Skehan, 1989).
Morales (1988) holds that attitudes are made up of three elements, which he considers to be existential states of human beings, what a person *knows*, *feels* and *does*. In the first place is the cognitive element of attitude made up of the knowledge and thoughts one has in relation to the attitudinal object. Secondis the affective element, the feeling in favor or against the attitudinal object. Finally, the third is the behavioral element which instigates action be way of behavior coherent with the affection related to the attitudinal object. Based on this, beliefs, evaluations and perceptions of principals towards ICT will be analyzed.

3. Literature on Teachers' Attitudes towards ICT

Generically speaking, it may be said that teachers' attitudes are situated at opposite ends of the discussion: between technophobia and technophilia, that is to say, total rejection of using machines (due to unfamiliarity, lack of confidence in their use, expectations of poor outcome…) and the feeling of completely belonging to the world of technology, considering it to be equivalent to progress and the solution to many problems.

Most research which has been done on the subject mention as the causes which generate negative attitudes to change, the fact that there is no evidence of the real effectiveness of the use of computers in learning, the scarce knowledge of hardware and software and lack of time and means. According to Angulo, García and González (2011) the most problematic aspects related to teachers using technology are: (1) resistance to change, (2) deficiencies in their training in the use of these technologies, (3) fear of losing authority and being surpassedby the students, and (4) an idea that the computer replaces the teacher.

In turn, Tejedor, García-Valcárcel, Prada (2009) maintain that teachers report positive feelings and evaluations towards technological media, considering them to be valuable aids for learning, although they are quite critical of their present-day use, due to the lack of software, the organization of teaching and teacher training. These authors have tried to find an explanation for the attitudes of the teachers. Their findings mention that professors feel as if they will have to confront important changes when they integrate this technology into their teaching, which may lead to a feeling of being overloaded and toreactions of anxiety and resistance.

Tejedor and García-Valcárcel (2006) believe that attitudes are cognitive constructs expressed through opinions which predispose us to certain determined actions. They assert that attitude is a predisposition to action; a learned, non-innate stable predisposition which nevertheless is susceptible to change, to reacting evaluatively towards an object, which implies a clear link with the behavior to be carried out. What teachers believe about the didactic potential of ICT without a doubt conditions the use they will make of these tools in their professional work (Arras, Torres & Fierro, 2012; García-Valcárcel& Arras, 2011). Thus the importance of knowing the attitudes shown by the teachers in relation to the use of ICT in education.

Teachers'attitudes towards the use of ITC are an essential factor in determining how they will use them (Fuentes, Ortega & Lorenzo, 2005; Sipilä, 2010). Cavas, Cavas, Karaoglan andKisla (2009) aver that teachers' attitudes toward ICT have important implications in the use given to them during teaching. This implies that the teachers' attitudes towards ICT will affect their integration into their teaching, positively or negatively as the case may be. According to a group of researchers in northern Mexico, findings reported at elementary school levelmay be divided into two kinds, based on whether teachers have positive or negative attitudes towards ICT (Valdés, Arreola, Angulo, Carlos &García, 2011).

Similarly, other studies reportingpositive attitudes of teachers towards ICT, point out that the majority of teachers believe that ICT are applicable to education, showing confidence in technology. Theyalsofeelthat ICT modifystudents' learningpositively (Lignan-Camarena, 1999; Fernández, Hinojo& Aznar, 2002; López, Espinoza& Flores, 2006; Miranda, 2009; Riascos, Quintero & Ávila, 2009; Garzón-Clemente, 2009; Area-Moreira, 2010).

However, different findings indicate the presence of negative attitudes of teachers towards ICT (Ochoa, Vázquez, Trevizo, Quiroga& Angulo, 2009; Selwood& Pilkington, 2005). Results show that teachers express fear of ICT, perceive difficulties in their use in the classroom and more workload for the teacher.

Meanwhile, Lignan-Camarena (1999) and Thomas and Stratton (2006) have focused their studies on variables which influence teachers' attitudes towards ICT, among which are: age, years of schooling and whether or not they have a computer in their homes. These authors found that younger teachers and those with more chances of interaction with ICT, due to having access to them at school or in their homes, were those with a more positive attitude towards using ICT.

Torres, Aviles and Romero (2012) have addressed understanding what is happening in one area of the country with respect to what teachers believe. Their findings are aimed at pointing out that the majority of teachers hold a positive attitude although some aspects such as the infrastructure, continuous training and the designing of educational programs using ICT support have gone unsolved. Another aspect they pointed out was that teachers assure that ICT make their professional development easier and improve the teaching-learning process in the classroom easier. They stress that teachers realize that ICT are a reality and if they do not become proficient in their use, they will be left behind.

There are also comparative studies (Torres & Angulo, 2013) in two regions of the country (Veracruz and Sonora) in which differences are reported in the teachers' perceptions. They emphasize that teachers' attitudes in Veracruz are less positive than those of teachers in Sonora. They also stress that the use of ICT as support material in professional practice is not clearly defined. This is mainly due to the non-defined attitude of teachers in relation to the variable which measured the ease to accessing ICT and availability in schools.

4. Methodology

In order to discover principals' attitudes towards incorporating ICT in public primary schools in Veracruz, a descriptive study with a quantitative approach was used. Directors from 214 public primary schools participated in the study. Representative probabilistic sampling was used with 41 principals giving a probability of occurrence of 90% with a standard error of 5%.

The instrument used to carry out the study was a Likert attitude rating scale developed by Sigalés, Mominó, Meneses and Badia (2009), in which those aspects which constitute the attitudinal framework of principals in relation to incorporating ICT would be identified. The study consisted of 31 questions with possible answers of 1 through 5 (1-Totally agree; 2-Agree; 3-Neither agree nor disagree; 4-Disagree; and 5-Totally disagree). The reliability of the instrument was corroborated using Cronbach's alpha coefficient, obtaining an acceptable value of 0.891. The study was made individually in written format. The SPSS v.18 statistical package was used to analyze the results.

4.1 Reporting on the Sampling

Out of 55 schools visited, 45 principals participated, a group made up of 36 women (78.3%) and 10 men (21.7%), with an average age of 48 years (minimum 38 and maximum 63). With reference to the level of education of the principals who participated, these are the figures: 50% hold a Bachelor's degree, 10.9% a Master's, 15.2% had basic teacher training, 19.6% were trained in teachers' colleges and 4.3% had a specialization. With respect to the years of experience as principals in the same or another school, 8.7% had been there less than a year. The most numerous group was those who had been principals forbetween 1 and 5 years (32.6%), followed by those with 6-10 years experience (23.9%). The lower percentiles were distributed mostly among those who had been in their posts the longest (8.7% between 11 and 15 years; 4.3% between 16 and 20 years; and 4.3% between 21 and 25 years). The exception was principals with over 26 years in their positions, representing 17.4%.

In terms of the personal technological equipment they possessed, 97.8% reported having at least one computer in the home and 95.7% said they had Internet access at home. 80.4% of the principals said they had computers at school, while 71.7% reported that their school does not have an audiovisual room.

With reference to the condition of computers at their schools, 47.8% of the principals stated that at their schools there were no computers which were not working. 41.2% said they had between 1 and 5 computers which were not working while 10.9% stated that between 7 and 20 computers were out of order. For example, the following information was reported: (a) one school with 7 computers out of order, (b) one school with 9 computers not working; (c) 2 schools with 12 computers each out of order and (d) one school with 20 computers not working.
It is worth mentioning that in most schools all of the computers are in use (91.3%) and there are no extra computers which may be used to substitute equipment which may break down.

Numbers in relation to the computer equipment in each school show that at least 15.2% of the principals reported not having any computers at all. 41.3% said they had between 1 and 5 computers and 17.4% of the principals reported having between 6 and 10 computers. 15.3% said they had between 11 and 15 computers in their schools. Only 6.6% of the schools had between 26 and 30 computers. One school, the equivalent of 2.2% reported having 27 computers, one school 28 and one school 36 and only one school had 45 computers.

Of the computers found in operating condition in public primary schools used in the educational sphere, it is worth mentioning that 43.5% of the principals stated that none of these computers were being used for educational activities, while in 37% of the schools between 1 and 5 computers were used for educational purposes. There were only two schools, 4.4% of the total number, with 6 to 10 computers being used for educational purposes while 10.8% of the schools had between 11 and 15 computers in use for educationalpurposes. Only two principals placed their schools in the highest range, the first reporting 25 computers in use for this purpose and the second 34 computers.

In relation to the use of computers within the school installations, 73.9% were in use by the principals, 60.9% by teachers, 8.7% by administrative workers and 37% by students.

The kind of Internet access for the computers in public primary schools in Veracruz (telephone with commuter, permanent land line, cable, satellite antenna) may be used as an indicator of the relative degree of freedom each school has when deciding the kind of connection to be used. The indicators used to determine whether a school had Internetis in relation to 78.3% of principals affirming that the school had an e-mail address, 2.2% have a webpage and 6.5% have a blog.

5. Results

Table 1 shows a condensed version of the results obtained for the principals' attitudes on the use of ICT, presenting various dimensions ranging from beliefs to evaluations and perceptions of those interviewed, taking into account aspects related to their technological abilities, teaching abilities, possible pedagogical application, ease in use, effect on educational support, affective aspects, professional applications, role played in communication and interaction, state of the technological infrastructure to the possibilities of access to computers and Internet.

We will now proceed to describe the main results for each of these *dimensions of the principals' perceptions in relation to the use of ICT*.

5.1 Principals' Beliefs on Technological Activities

The questions in this dimension are related to the role and necessities of receiving technological training as well as the degree of confidence the principals have in terms of self-learning.

With reference to the kind of attitude held by the principals in relation to the use of ICT in the category *consider training in the use of ICT to be important* there is clear consensus of the relevance of technological training (93.50% opted for the choice "Totally agree" and 6.5% for "Agree"). There was consensus with respect to *there should be more training courses in theuse of ICT* (91.3% opted for "Totally agree" and 8.7 say they "Agree"). However, in relation to the principals' beliefs about *easily learn to use software following the instruction manual*it was found that there was a favorable tendency towards self-learning represented by 41.3% who said they "Agree" and 23.9% who chose "Totally agree." On the other hand, almost 3 out of 10 principals do not use the manuals and prefer other mechanisms for learning to use software (6.5% marked "Disagree" and 2.2% "Totally disagree").

5.2Beliefs Related to Pedagogical Abilities

The questions in this area are related to the role ICT play in pedagogical aspects of the design of activities, the way teaching is carried out and evaluation mechanisms.

It was found that the majority of the principals (at least 90% or more for each of the questions) was positive in acknowledging the role ICT plays in the pedagogic sphere, making the processes of evaluation, class planning, designing teaching activities and feedback on evaluations easier. It should be pointed out that the answers are in the category of "Totally agree" with an average of 50%, and "Agree" with an average of about 40%. There was no one who thought that ICT was not useful for these ends. The remaining principals' answers were in the neutral areas. In the first three questions they were no higher than 5% and in the last not higher than 10%.

5.3Evaluation of Pedagogical Application of ICT

The questions in this section have to do with the way in which ICT may help students search for information and manage content. In the previous section we saw the consensus on the perspective of the teachers' applicability of ICT. In this dimension we explore the pedagogical application from the students' point of view. There was also a definite consensus of the positive role ICT plays in easing the students' ability to obtain information and the help provided by these tools specifically in obtaining scientific information (over 97%). With respect to the question of the convenience of using ICT in presenting information as well as motivating students in the learning process, all of those surveyed agreed, there were no negative or undecided answers on these aspects.

5.4Perception on the Ease of Using ICT

The questions in this dimension tackle the degree of usability of technological tools with respect to cooperation and collaboration among teachers or between teachers and their students. In general the results of this dimension show a favorable perception on the usability of ICT, that is, eight out of ten principals agreed and in another question 7 out of ten.

With respect to the attitudes of principals in the question of whether *ICT favor creating work spaces with students* the results showed 45.7% "Totally agreed," 32.6% "Agreed," 19.5% had a neutral response and 2.2% said they "Disagree."

When taking into consideration the principals' answers to the question, *ICT favor the creation of work spaces shared with other teachers* the majority "Totally agree" 52.2%, 36.9% "Agree," 8.7% "Neither agree nor disagree" and 2.2% "Disagree."

With respect to principals' feeling on the use of ICT in the category *it is easy to access virtual educational platforms* the results proved that the use of this technology is partially defined. This is reflected in the opinion "Agree" with 43.4%, 19.6% "Totally agree," 26.1% had no clear opinion ("Neither agree nor disagree"), while at least ten percent expressed difficulties in accessing these technological tools ("Disagree" 8.7% and "Totally disagree" 2.2%).

5.5 Perception of the Support ICT Provide in Learning

The questions associated with this dimension are in relation to the principals' opinions on the helpfulness of ICT in the learning process and in teamwork.93.5% of the principals agreed that ICT *help students with their learning process* (60.9% "Totally agree" and 32.6% say they "Agree") while 4.3% chose "Neither agree nor disagree" and 2.2% said they "Disagree."

In relation to the principals' attitudes on whether *ICT help students apply cooperative learning,* a high percentage (80.4%) corroborated the fact that there is a marked acknowledgement of the possible usefulness played by these technologies (43.5% opted for "Totally agree" and 36.9% chose "Agree"). The rest of the answers were distributed in 10.9% "Neither agree nor disagree" and 8.7% who "Disagree."

5.6 Affective Evaluation

The questions in this section ask about the feelings of comfort principals have with the use of ICT in administrative and educational work as well as their point of view on how they think students feel with respect to this topic.

Most principals (95.7%) said they liked to use the computer (60.9% "Totally agree" and 34.8% chose the option "Agree") while 4.3% expressed indecision. In relation to principals' attitudes towards the question about *it being easier for students to learn when they use ICT,* there is still a majority of principals (84.8%) within the affirmative range (58.7% "Totally agree" and 26.1% "Agree"). 2.1% responded with "Neither agree nor disagree" and 4.3% negatively.

On the other hand, principals' attitudes towards the question of whether *Enciclomediais easy to use*, they generally held a positive attitude (58.7% "Totally agree" and 37% "Agree"). 2.1% held a "Neither agree nor disagree" stance and only 2.2% chose "Disagree."

In relation to principals' attitudes in the category *ICT makes administrative management related to my professional work easier,* the vast majority agreed (65.2% "Totally agree" and 26.1% "Agree") only 8.7% chose the neutral option.

5.7 Evaluation of Professional Applications

The questions associated with this dimensions have to do with the way in which these technological tools may be used to promote principals' professional development, improve students' learning and facilitate pursuing graduate studies.

The principals unanimously acknowledged that ICT *favor professional development* (87% chose "Totally agree" and 13% said they "Agree"). The results were similar for their points of view on *ICT favor students' learning*wherethere was total positive consensus (71.7% "Totally agree" and 28.3% "Agree").

On the attitudes of principals on the use of ICT, in relation to whether *ICT favorpursuing graduate studies* the percentage was once again very high in the areas of "Totally agree" with 63% and "Agree" with 26.1%, while the option "Neither agree nor disagree" received 10.9%.

5.8 Beliefs on Communication/Interaction

The questions in this section are related to the role ICT plays as a communication mechanism with students, parents and others.

On principals' attitudes on it *is easy to surf the Web using Internet,* in the first place the options chosen most often were "Totally agree" and "Agree" with 45.7% and 47.8% respectively; while the following option was "Neither agree nor disagree" with 4.3% and the rest for "Disagree" with 2.2%.

Furthermore for the attitudes related to whether *ICT facilitates communicating with students* the answers show acceptance, with "Totally agree" and "Agree" adding up to 76.1%. 19.6% responded "Neither agree nor disagree" and 4.3% marked "Disagree." In this respect, we consider it important to make an in-depth study into the degree of communication that goes on between teachers and students at a later date.

In terms of whether ICT can serve to facilitate communication with parents, there is still a long way to go. At least a third of the principals had no definite criteria (34.8%), which indicated the lack of pertinence in the face of the prevalence of traditional methods of communication, such as notifications, posters or oral communication. In spite of this, at least half of the principals believe it could constitute a useful and efficient measure in the medium term (26.1% stated they "Totally agree" and 28.2% chose the option "Agree"). Finally in last place is the alternative "Disagree" with 10.9%.

5.9 Perception of Technological Infrastructure

The questions associated with this dimension are related to the availability and access to technology in terms of the existence of audiovisual rooms, multimedia projectors and conditions for using Enciclomedia in the classroom.

For the question of whether *it is easy to have access to the audiovisual room at school* there was not a positive consensus of the majority of the principals and there was abstinence of 21.70%. The most significant values perceived by the lack of availability of the audiovisual room (28.30% expressed "Totally disagree" and 10.90% "Disagree"), partly because there was no audiovisual room or it was not properly conditioned for use.

With respect to principals' positions on *it is easy to have access to the multimedia projector at school*, at least half of those surveyed had a favorable perception ("Agree" 34.8% and "Totally agree" 15.2%). Almost a third adopted a "Neither agree nor disagree" position, indicating underuse or lack of use of these means. On the other hand 2 out of 10 principals saw access to these resources as a problem (10.9% "Totally disagree" and 8.7% "Disagree").
In the category on whether *ther*e *are the proper conditions for using Enciclomedia in the classroom*the results aredisperse despite the fact that literature has proven the failure of this federal program. Moreover, our findings show that merely implementing technological infrastructure without specific strategies for technical and pedagogical training of teachers and advisory programs and follow up are key aspects which deserve further evaluation when incorporating ICT into school programs.

The results were spread in the following way: 26.1% "Totally agree," 19.5% "Agree," 19.5% were undecided and chose "Neither agree nor disagree," while almost two fifths of the principals expressed the absence of proper conditions ("Disagree" and "Totally disagree" each received 17.4%).

5.10 Perceptions on Internet Access and Setting up the Computing Equipment

The questions associated with this aspect have to do with the availability of Internet and the accessibility to computers in the school.

For the question of whether *Internet is available at school*, the answers tended towards "Totally agree" and "Agree" with 30.5% and 56.5%, respectively. However 4.3% of the principals took a "Neither agree nor disagree" stance while 8.7% "totally disagree." It should be pointed out that while 70% of the schools do not have computer rooms, 73.9% of the principals have access to computers, but only 60.9% of the teachers and 37% of the students have access.

With reference to principals' feelings on whether *it is easy to haveaccess to a computer at school*, the most significant values show a positive attitude ("Totally agree" with 30.4% and "Agree" with 30.5%) for more than half of those interviewed. However, at least a fifth did not adopt a definitive position (21.7%). 17.4% exhibited difficulties in trying to use the computer equipment at their schools ("Disagree" and "Totally Disagree," both with 8.7%).

6. Conclusions

The process of integrating ICT into the classrooms of public primary schools in the municipality of Veracruz is an unfinished process; data shows that the majority of principals has positive attitudes in this respect and they themselves have a certain degree of skills in this Malthusian technology, but mainly for carrying out their administrative work. They acknowledge deficiencies in infrastructure, training and the design of educational programs supported by ICT.

However, this process of technological integration of ICT does not seem to have promoted the habitual use of this technology by the majority of the principals, nor has its use triggered significant changes in educational objectives, nor in the way in which students learn. There is a long way to go and teachers and principals cannot be made solely responsible for this task.

The Mexican government has made an effort by endowing technological resources to the schools on several occasions-such as the failed attempt of Enciclomedia. Experience proves that steps must be taken beyond this endowment, such as providing the necessary infrastructure in telecommunications, plans for introduction to, training in and follow-up on the exploitation of these technologies. Above all, structural reforms in the Mexican educational system whichwould be fairer and more equalitarian, focused on promoting the development and evaluation of true careers in education, must be enacted.

This educational reform should ensure greater presence of ICT in educational activities, higher levels of information competencies among principals, teachers and students as well as assuring that ICT be given greater use in improving the quality of learning.

This study shows that while the introduction of ICT in public education has been presented as a normative mandate, it has turned out to be more of an invitation to school actors. Its practical materialization depends on the understanding and acceptance by the recipients of said policies and programs. Its viability as public policy is linked to the attitude held by these actors in relation to ICT, and the technological and pedagogical abilities and knowledge they possess.

Apparently, as seen through this survey, principals are committed to the process of integrating ICT, however steps need to be taken to (1) Promote the use of ICT in teaching, beyond administrative procedures and recreation; (2) Permanently develop digital and technological competencies in principals, teachers and students; (3) Increase the number of computers available at least in the audiovisual room; (4) Elaborate plans for administering ICT in schools, assuring they are kept up and permanent, and the creation of a position for a teacher in each school with broad experience and techno-pedagogical training; and (5) Promote the elaboration of training and refresher courses in the use of ICT in teaching.

In this respect, the problem that prevails in Mexico has to do with this invitation for teachers to include ICT not being concrete. This proves very costly for society. Technological change has constituted the paradigm which appears to regulate the growth of countries around the world. Adopting ICT at the elementary level within the educational sphere opens individual's windows to opportunities on the path to knowledge, an understanding of the world in which he/she lives and inclusion in today's society which is ever-more characterized by self-management in learning backed up by the application of digital competencies in everyday matters.

It is precisely in basic national education that the bases of the future citizens of our country are built and therefore the role played by principals, teachers and students in their everyday lives in relation to adopting ICT are established as symbols of modernization in pedagogical innovation and in the battle against classic education models. Therefore, it is necessary to intensify efforts to provide these actors with mechanisms of social and technological equity.

In terms of informatics policy, serious reassessment and in-depth review of the concepts implicit in the Mexican educational model, not only at the basic level, but also in teacher training, are required. This must include the procurement and maintenance of technological infrastructure, the development of teaching careers mediated by the use of ICT, incorporating a permanent national educational project which is not affected by political changes every six years, but rather associated with a vision of the education the country needs and desires.

7. Table 1

Table 1: Dimensions of the Study on Principals' Attitudes

Categories of the analysis on attitudes		Mean	Standard Deviation	Std. Mean
Beliefs of technological activities	Consider training in the use of ICT to be important	1.43	.583	.086
	There should be more training courses in the use of ICT	1.24	.431	.064
	Easily learn to use software following the instruction manual	1.07	.250	.037
	ICT make evaluations easier	1.09	.285	.042
Beliefs related to Pedagogical abilities	ICT help in class preparation	1.13	.341	.050
	ICT make designing teaching activities easier	1.26	.491	.072
	ICT help with feedback in evaluations	1.48	.691	.102
Evaluation of Pedagogical application of ICT	ICT make it easier for students to obtain information	1.28	.455	.067
	ICT make it easier to obtain scientific information	1.26	.444	.065
	The use of ICT is good for presenting contents	1.61	.856	.126
	ICT promote students' motivation for studying	1.48	.691	.102
	It is easy to access virtual educational platforms	1.35	.526	.078
Perception on the ease of using ICT	ICT favor the creation of workspaces with students	1.48	.658	.097
	ICT favor the creation of workplaces shared with other teachers	1.80	.910	.134
Perception of the support ICT provide in learning	ICT help students with their learning process	2.3	.986	.145
	ICT help students apply co-operative learning	1.43	.655	.097
Affective evaluation	Like to use the computer	1.78	.841	.124
	It is easier for students to learn when they use the computer	1.61	.747	.110
	Enciclomedia is easy to use	1.41	.541	.080
	ICT make administrative management related to my work easier	1.54	.585	.086
	ICT favor professional development	1.54	.657	.097
Evaluation of professional applications	ICT favor students' learning	1.63	.679	.100
	ICT favor graduate studies	1.85	.942	.139
|	It is easy to surf the Web using Internet	1.63	.679	.100
Beliefs on communication/interaction	ICT make communicating with parents easier	2.22	.964	.142
	ICT facilitate communicating with students	2.35	1.251	.184
Perception of technological infrastructure	The audio-visual room at school is available for use	1.74	1.163	.171
	It is easy to haveaccess to the multimedia projector at school	2.80	1.455	.214
	There are the conditions necessary for using Enciclomedia in the classroom	2.30	.963	.142
Perception of Internet Access and setting up computer equipment	Internet is available at school	2.65	1.178	.174
	It is easy to have access to a computer at school	3.11	1.479	.218

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