

DEVELOPMENT OF COMPETENCES IN THE USE OF THE ICT IN BASIC EDUCATION TEACHERS

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Abstract

The study of the training of Basic Education teachers and the development of their technological competencies in this era called "The knowledge society" is a prevailing necessity, so this research aimed to identify the training needs of teachers An institution of basic education, belonging to the private sector of the State of Yucatan in the use of Information and Communication Technologies (ICT). The methodology used was based on the mixed approach (quantitative and qualitative), this allowed to perceive in an integral way the real situation of the teachers in the use and training in the ICT area. In the first phase of the study, a needs assessment was carried out, which was used to design and develop a Blended Learning (B-learning) course in the Modular Object Oriented Dynamic Learning Environment (MOODLE). The second phase was worked out the structure and logistics for its implementation; And finally, the results were analyzed and the conclusions were established. And finally, the results were analyzed and the conclusions were established. Among the important findings it was found that theory and practice are elements that must be worked together, simultaneously, in a way that they assist one another in the training course in the use of ICT. This way, an atmosphere of security and confidence is generated between the teacher and the student during their learning process.

Keywords: Teacher training, basic education, technological competence, ICT.

1. Introduction

Nowadays, the technological advances have affected all the fields of the society and education has been no exception. This situation is reflected in the adoption of new paradigms in the form of teaching-learning, the redefinition of roles in education and in the design and development of didactic resources for use in the teaching-learning process in view of the need to Train teachers in the use of ICT. In this regard, Valdés, Angulo, et al. (2011) point out that the incorporation of ICT in educational programs has acquired special

relevance, under the assumption that these tools can promote a better educational quality and facilitate learning; In addition to helping to reduce the digital distance (p.212). In this sense, Ramírez (2006 quoting Valdés, Angulo, Urías, García and Mortis 2011), affirms that the process of incorporation of ICT by teachers in educational institutions has happened quickly resulting in new demands for teachers (Page 212). As part of these demands, the role that the teacher plays in education has been transformed from an agent that only transmits information to a guide that facilitates student learning. According to Rodríguez and Gutiérrez (2011) in the Comprehensive Reform of Basic Education (RIEB) of 2011 aims to the urgency of integrating ICT into teacher practice, in a way that not only benefits itself, but also relapses In the academic achievement of the students and, therefore, in the quality of the institution's processes (p.255).

In relation to this, it is necessary to transform teacher training in such a way that, as stated by Suárez, Almerich, Gargallo, and Aliaga (2010), in structuring these plans, two basic dimensions must be taken into account. In the first dimension, they must be organized in a series of stages in which the technological and pedagogical components are found, and in the second, that the organization of these training plans must be flexible and according to the needs presented by the teachers (p.24). It should be pointed out that there are several factors involved in the training of teachers, such as the consistency of courses, personal factors and context that influence the integration of ICT in their practice. In this regard, Suárez et al. (2010) assert that, as regards the incorporation of technological resources in their daily educational practice, teachers only contemplate it on certain occasions, it does not consider it in a regular or habitual way, focusing mainly on a personal plane (p. 24). This situation highlights the segmentation that teachers make when using technology; Which generates a decoupling of this with the academic aspects and the teaching-learning processes. Thus, the inclusion of ICT in the practice of teachers is affected by the lack of habituation and the belief that technology is a resource unrelated to their activities in the educational institution.

2. Development

The training of teachers in the use of ICT and the integration of them in their educational practice has become a priority on the part of the authorities of the different educational institutions due to the demands that society itself poses in recent times. As Domínguez and Canto (2012) point out contemporary teachers, work in a teaching-learning technological environment, where they have to fulfill basic roles (competencies) as a result of the influence that the context has on his professional task (p.95) In this sense, the teacher and the role that he plays acquire greater relevance to the new educational challenges, since the insertion of the technologies in the teaching-learning processes is required. The demands are therefore greater, it is no longer just focus on training in educational models or approaches, teaching and learning strategies, learning styles, educational skills and knowledge; But also in a training in which the incorporation of ICT is linked to all the previous requirements.

2.1 Training of Basic Education teachers in the use of ICT at national level

2.1.1 The Enciclomedia Project

The Enciclomedia project was implemented in the government of President Vicente Fox, whose objective

was to be a computer tool with digitized textbooks and useful information for primary level students (Balderas 2009: 79). As a pedagogical device in the classroom, it articulated multiple processes and components that were based on free digital textbooks enriched with multimedia resources, aimed at providing varied options for teaching work (Elizondo, Paredes and Prieto, 2006, p.214). One of its main critics has been this context, since it only constituted solely in the digital image transfer of the books to a computer program. In this respect, Navarro (2011) mentions that the first phase of the Enciclomedia Project lacked an analysis of alternatives, which considered the pedagogical aspects, those of equity, the operational complexity and the limited availability of public resources (p. 706)

The program started in its testing phase during the school year (2003-2004) in five schools of the Federal District and was installed in 21,434 classrooms of 5 and 6 grade of elementary school, located in 6,700 schools of the national territory, in addition in 548 Teacher centers, 32 regular schools and 74 indigenous schools. By the end of 2005 it was planned to equip approximately 95,000 classrooms of 5 ° and 6 °. (Elizondo, Paredes and Prieto, 2006, p.215). In this regard, it is convenient to mention that the conditions of Mexico in comparison with other countries of the first world are many deficiencies to solve, ranging from the economic situation of people living in the most retired towns, as well as Internet access, The resources available and the limited infrastructure of the centers or schools. In light of the above, it is necessary to ask questions about the true intention of this program and its impact, as well as the previous planning and the purposes for which it was designed.

2.1.2 Digital Skills for Everyone(DSE)

Because of the different educational situations the country was experiencing, in 2005 the Organization for Economic Co-operation and Development (OECD) made some recommendations, among which it was found that Mexico had to focus attention on the Incorporation of skills and abilities in literacy, mathematics and information technologies. To manage this recommendation, it was proposed the technological update of the Enciclomedia platform in its portable version, to make it compatible with the Internet; Experts with international experience in ICT applied to Education were contracted, who designed five components to implement the digital skills for everyone program. The components are: pedagogical, accompanying, management, infrastructure and project operation (Navarro, 2011, pp. 713-714).

The main purpose of the program and its telematics classrooms was to improve the learning process using computer tools that, when used in the teaching-learning process, could expand students' competences and begin to generate a digital educational environment (Navarro 2011, p.707). However, like the previous program, the HDT implementation had to face the difficulties that the education system itself brings with it, the deficiencies in infrastructure, the inequalities in the different localities, the economic factor, the preparation of the teachers, and the lack of resources. In this sense, the HDT was an effort and set of actions directed to the solution of the real educational problems that are in line with the situations of each educational center. As Domínguez and Canto (2012) point out, integrating ICT into education is an opportunity to insert the new generations into a digital culture and to acquire the necessary skills to improve their living conditions in a knowledge society (p. 95). Technologies are resources that need to be included in the teaching-learning processes, however, this integration must be the result of a needs study.

2.1.3 Digital Inclusion Program (DIP)

Because of the rapid advance of technologies and the emergence of the knowledge society, the Federal Government established the incorporation of information and communication technologies (ICT) in the teaching-learning process as one of the strategies to achieve the national objective of developing the human potential of Mexicans with quality education. To support this incorporation, it was established as a commitment of the government to provide portable computer equipment to students in fifth or sixth grades of public elementary schools. The Secretaría de Educación Pública (SEP) [Ministry of Public Education], in compliance with this mandate, launched the Digital Inclusion and Literacy Program (PIAD) (SEP, 2015) from the school year of 2014-2015.

PIAD is a public education program that, within the framework of Educational Reform, aims to improve the quality of study processes and reduce the digital distance that exists in society with a strategy based on three main pillars: Access to technology, The development of digital resources linked to curricular themes and the training of teachers (SEP, 2015).

2.2 The educational challenge of teacher training in the use of ICT at national level

The efficient integration of ICT into education has not been a simple task. Its use has increased in the educational context, but its full potential has not been reached; moreover, pedagogical thinking has not advanced along with technological progress (Valdés, Arreola, et al., 2011, p.

There is a gap between the dizzying advances in technology and science and the changes that education has made. Part of this situation is the resistance to paradigm change, the need for infrastructure, the economic factor, openness to the use of technology and other educational needs that have not yet been resolved.

It is due the previously mentioned that the SEP (2001, in Elizondo, Paredes and Prieto, 2006) in the National Education Program indicates the promotion in the educational use of Information and Communication Technologies, as well as the design and development of Audio-visual and computer-based materials to support learning (p.212). On the other hand, the *Reforma Integral de Educacion Básica* (RIEB) urges teachers to make creative and permanent use of the reading, audiovisual and computer resources available to them, so that they do not rest exclusively in the Textbooks as the great prescribers of work in the classroom (Ruiz, 2012, p.54).

It is for all the above that the training of teachers for the implementation of the RIEB in primary is a fundamental challenge of the continuous training of teachers in Mexico. A challenge that has to do with the criticism of continuing education programs, failing to meet the true needs of teachers and the lack of an effective mechanism to communicate to administrators of the education system, what they need (Ruiz, 2012, Pp. 55 and 58).

In this sense, criticisms of teacher training programs in the field of technology have been diverse, however, what is evident is the need to prepare them in pedagogical field and in the technological competences to operate in a timely manner and according to the requirements Of this new society of information and knowledge, to train them for the development of skills that allow them to use ICT and integrate them in a relevant way to their educational practice.

3. Methodology

The methodology used for the study was based on the mixed approach, this approach consists of a process of collecting, analyzing and linking quantitative and qualitative data in the same study, in order to respond to a problem approach. (Hernández, Fernández and Baptista, 2010, p.544). It represents a set of systematic, organized and empirical processes in a single study so that a complex analysis and discussion of the information collected with instruments and under the quantitative approach and research techniques of the qualitative approach is carried out, as well as their integration and discussion, In order to achieve a better understanding of the phenomenon under study (Hernández and Mendoza (2008 in Hernández et al., 2010 p.546).

3.1 Instructional Model PRADDIE

In the construction of the course, the instructional model called PRADDIE was followed (Cookson, 2003). The activities that were carried out as part of each of the phases that compose said model are described below.

Pre-analysis. In this first phase of instructional design, the main policies related to the training of teachers in the use of ICTs were identified and analyzed, as well as the mission, vision, values and policies of the study center, which form the basis for this innovative proposal and determined the relevance of the actions to be carried out.

Analysis. At present, the need to train teachers in the use of ICT has become a priority, so the offer of courses related to this subject has been increasing; However, the reality is that these programs in some cases are neither planned according to the needs of teachers nor they have a focus on the particular context of the school. It is for this reason that in this phase, a diagnosis of training needs in the use of ICT was made. Based on the information obtained from the diagnosis, it was worked on the construction of the course outline; It was based on the needs and interests of basic education teachers regarding the use of ICT in education. Then, as can be seen in Figure 1, the main topics of the course are presented, which were the basis for the design, development and implementation of the course.

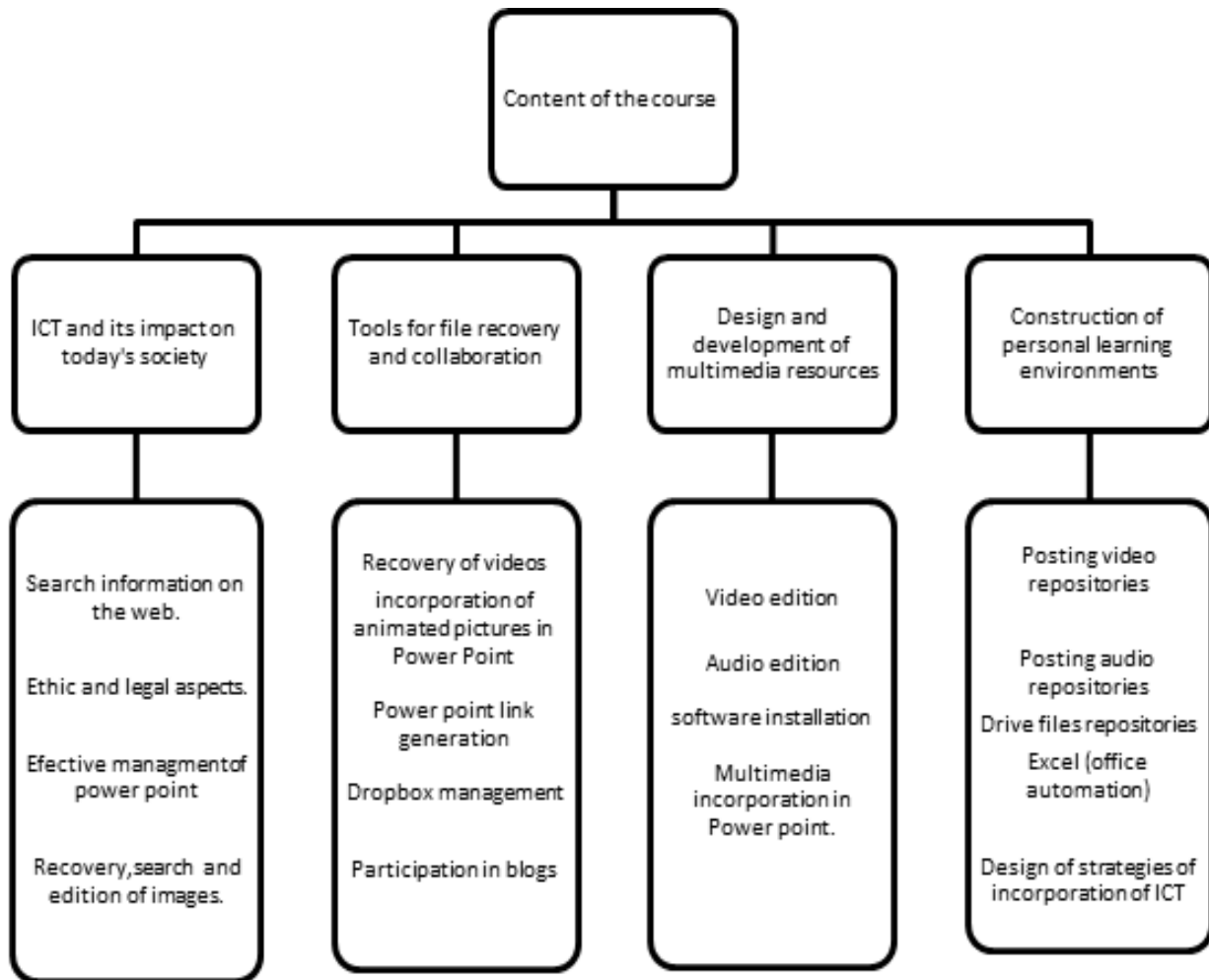


Figure 1. Course content

Design. In this phase the mode of the course was determined, which was implemented in a virtual and presential way, the b-learning modality, which is characterized by the juxtaposition or mixing between teaching and learning processes face-to-face with others that are developed at a distance through use of the computer (Area, 2009, page 68). The proposal of the course design was elaborated, which was articulated in 4 sessions, having as reference the outline of the content. In this case, the main topics of each session, the content, the competences to be developed, the evaluation strategies and criteria, as well as the learning activities were determined. In the learning activities, it was established the face-to-face or online modality, the form of work, individual or team, the execution time, strategies for learning and the resources of the platform that would be used.

Development. In this phase the elements of the design were considered for the elaboration of the didactic sequences of each session. The didactic sequence is defined as the articulated set of activities for learning and evaluation; Mediated by a teacher for the achievement of educational goals (Tobón, Pimienta and García, 2010, p.20).

The activities (see figure 2) were organized in the four sessions, trying to maintain a balance between them and the modalities of face-to-face and online work. Also, it can be observed that the learning journal is present in each session as a key point for the achievement of meaningful learning.

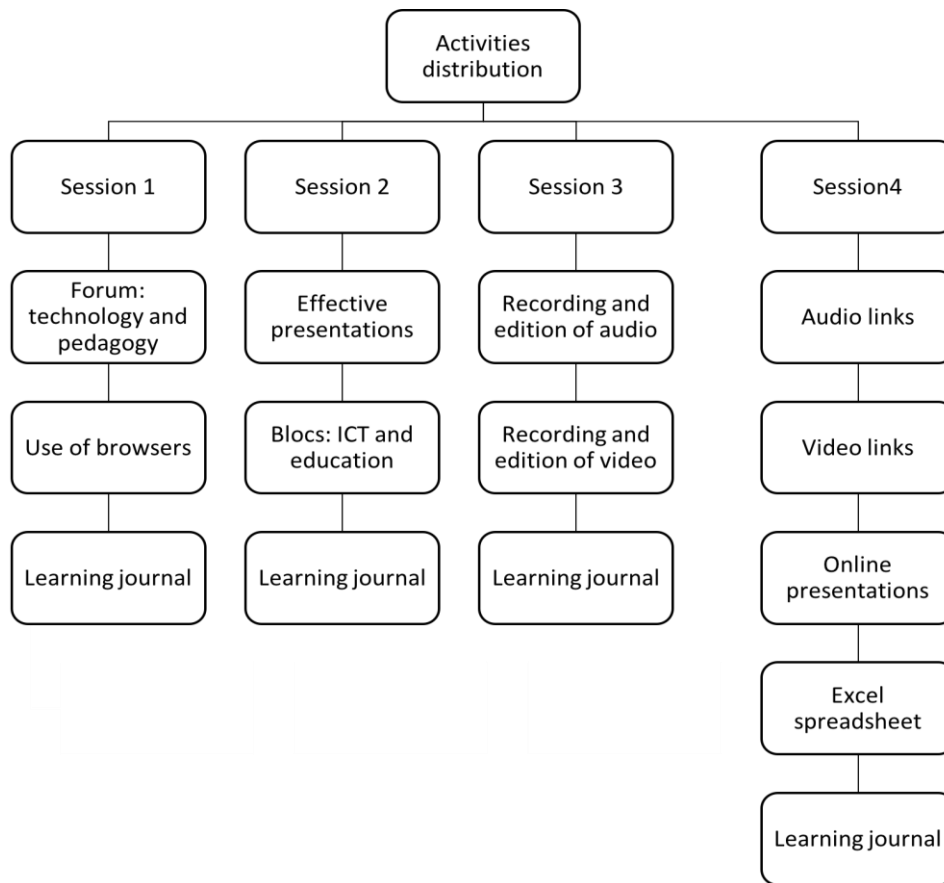


Figure 2. Organization of the activities by session

Implementation. In this phase, the dates of the four working sessions were established. Likewise, the work schedule was determined, which began at 8:00 am and concluded at 12:00 pm in each case.

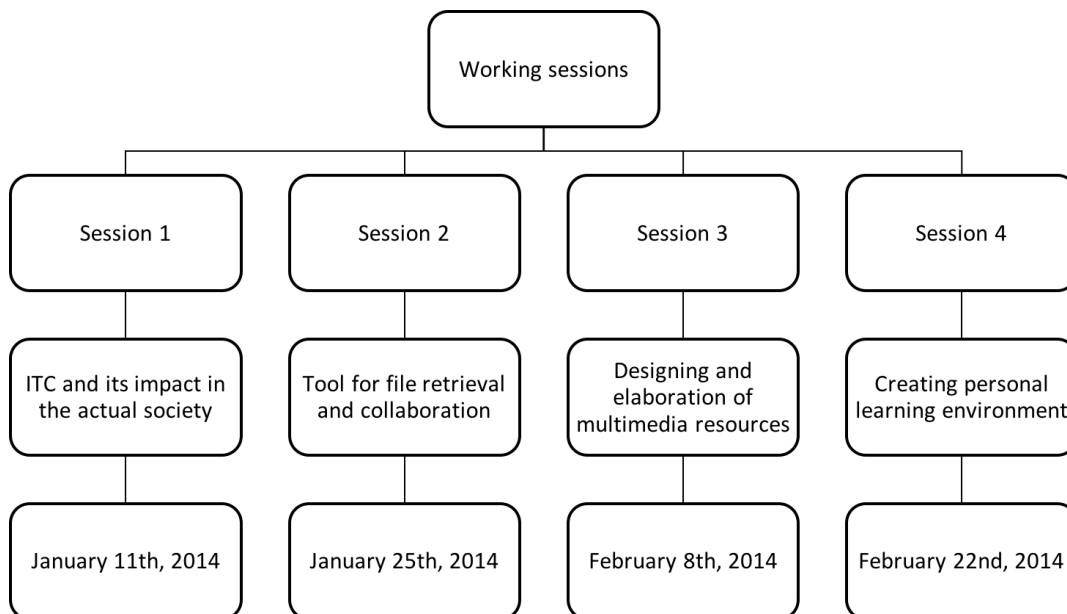


Figure 3. Working sessions

As can be seen in figure 3, the implementation period corresponded to the months of January and February

of this year. Thereon, it is necessary to mention that the organization was based considerate providing the participants with the necessary time for the execution of the various activities of the course.

Evaluation. As Cookson points out in his proposal, evaluation is considered as a continuous process in this instructional design model. In this sense, the evaluation was present in all phases, so that in each of them the necessary adjustments were made according to the demands and needs of the participants and the educational institution.

During the implementation phase of the course, the teachers made learning journals of each session using the Moodle platform. Thereon, Vélez, González, Hernández, Rodríguez and Matesanz (2012) point out that the journal is defined as an instrument of formative evaluation that considers the student as the axis of the formative process, promoting the reflexive practice, because the main idea of the journal is write to learn (p.91).

The learning journals, in this case, were created with the purpose of promoting reflection and critical thinking about the learning process and the way in which it was acquired. In the same way they allowed to establish the learning and experiences of the participants regarding the use of ICT. At the end of the implementation phase, an evaluation process was carried out from two different approaches. On one side, on a quantitative research, a questionnaire with a Likert scale was elaborated to determine the degree of teachers' satisfaction with four dimensions: design of the course in its virtual modality, development of the course in its virtual modality, learning activities and the work of the instructor.

On the other hand, according to the qualitative paradigm a focus group was organized, in which the participants' experiences concerning the course were identified. Focus groups according to Barbour (2007 in Hernández, et al., 2010):

Represent a method of collecting data in which a group of people is gathered and working with it in relation to concepts, experiences, emotions, beliefs, categories, events or issues that are of interest in the research approach. What is sought is to analyze the interaction of the participants and how to construct meanings in groups. Focus groups not only have descriptive potential, but also have great comparative potential that needs to be harnessed (p. 426).

In this context, a questionnaire was designed to guide the participation of teachers during the focus group. The first question was addressed to the analysis of teachers' experiences and feelings in making use of technological resources; The second question allowed to identify the significant learning (s) of the teachers; The third question determined the relevance of content and / or learning to teaching practice; Question four consisted in questioning and reflecting on the relationship and use of technological tools in their practice; In question five, informants were asked about the achievements made through the course; In the sixth question, it was explore about how the change in the way technology was perceived; Finally, the seventh question was a general evaluation of the course.

4. Results

4.1 Descriptive analysis of B-learning course satisfaction

The instrument implemented to assess the satisfaction of the course in its B-learning modality consists of the following dimensions: a. Design of the course in its virtual modality; b. Development of the course in

its virtual modality; c. Learning activities; and d. Instructor performance. Measurement of the global frequency of instrument dimensions was also considered to enrich the analysis of information.

Furthermore, the instrument is considered reliable, since it can be observed that the result of the internal consistency analysis estimated with the Cronbach's alpha, the index that gave the test is 0.923 (N = 30), close to unity. This means that the measurements that were obtained from the instrument are stable and consistent: they are reliable.

Next, the analysis of each of the dimensions of the questionnaire is presented, considering as base the following scale: 1 not at all; 2 moderately satisfied and 3 very satisfied, indicating in this way the level of satisfaction of the user in each of the dimensions.

In the first dimension, which is related to the design of the course in its virtual modality, as can be seen in Table 1, most of the teachers are at the level of very satisfied and a lower percentage is moderately satisfied.

Table 1. Design of the course in its virtual modality

		Frequency	Percentage	Valid percentage	Cumulated percentage
Valid	Moderately satisfied	2	18.2	18.2	18.2
	Very satisfied	9	81.8	81.8	100.0
	Total	11	100.0	100.0	

In relation to the development of the course in its virtual modality, Table 2 indicates that 100% of the population is at the level of very satisfied.

Table 2. Development of the course in its virtual modality

		Frequency	Percentage	Valid percentage	Cumulated percentage
Valid	Very satisfied	11	100.0	100.0	100.0

Likewise, in the dimension of the learning activities developed during the course, as it is expressed in table 3, 100% of the teachers affirmed that they are at the level of very satisfied.

Table 3. Learning Activities

		Frequency	Percentage	Valid percentage	Cumulated percentage
Valid	Very satisfied	11	100.0	100.0	100.0

On the other hand, in relation to the teacher's performance during the sessions, the majority indicated to be at a very satisfied level, as shown in table 4.

Table 4. Instructor performance

		Frequency	Percentage	Valid percentage	Cumulated percentage
Valid	Moderately satisfied	3	27.3	27.3	27.3
	Very satisfied	8	72.7	72.7	100.0
	Total	11	100.0	100.0	

An overall analysis of the dimensions was also carried out (see Table 5). In general, the group stated that they were very satisfied with the implementation of the course in its b-learning modality.

Table 5. Overall frequency of instrument dimensions

		Frequency	Percentage	Valid percentage	Cumulated percentage
Valid	Very satisfied	11	100.0	100.0	100.0

4.2 Qualitative analysis on the course implementation, the experiences and learning of the teachers

Qualitative analysis was done of teachers' opinions regarding the implementation of the course, their experiences and lessons learned. The data collection technique that was used was the focus group and a qualitative analysis was developed through seven main previous categories. The results are presented.

Experiences of how they felt using technology tools

The teachers expressed that they were nervous, anxious about the challenge of using an unknown resource, excitement and interest for continuous improvement and satisfied with the results obtained.

Most significant learning of the use of technological resources

The most significant learnings expressed by teachers relate to the use of different programs such as PowerPoint, including audio, videos, animations, as well as Movie Maker to create stories through drawings (Draw my life) and the use of Audacity for the construction and edition of audios.

Relation of the obtained learning with his teaching task

Concerning their teaching task and learning achieved, teachers said that tools are useful not only because they allow the classes to be dynamic, but because they attend different learning styles, now they can create resources according to the themes, maturity of the child and learning needs, as well, they mentioned as benefits the reinforcement of knowledge through this type of activities and the stimulation of children for the use of technology.

Use of the tools included in the course in the practice

In general, the teachers affirmed that the tools are useful for the different subjects they teach, as well as the students' styles, maturity and needs, because they involve the teacher and the student in an interaction that it is a challenge for them to achieve and with it a transformation of the innovative learning situation.

The progress made during the implementation of the course

Concerning the achievements made during the course, teachers generally expressed that they made significant progress in developing their own resources and developing the skills to create their materials and the interest to continue learning in a innovative way.

Opinion about ICT

Regarding the opinion about the use of ICT, most of the teachers said that the progress was in the change of attitude regarding its use; As well as their commitment to their profession and to the educational community by innovating and attending to the needs of the students, continually being trained.

General view about course content, learning activities and instructor

Teachers indicated that the course had an adequate organization, the contents were according to the needs, the work was simple and the instructor solved the different doubts that were emerging. The use of the platform to develop tasks, interacting with their partners made an interesting and innovative activity as it involved transforming their vision regarding ICT and especially the collaborative work.

4.3 Analysis of learning journals

One of the learning activities that the teachers developed at the end of each session was the construction of the learning journals, which were written under the guidance of the following questions: ¿What did I learn? How did I learn it? What do I have to learn? What was my meaningful learning?

Analysis and reflection of the teacher training experience from the journals

Teachers identified as main learning the concept of educational platform, its operation, the construction of effective presentations in PowerPoint, the download of images and the search strategies of reliable information, as well as the use of ICT in the practice.

On the other hand, based on the contents studied, the teachers identified as main learning the construction of PowerPoint presentations with hyperlinks, images, gifs, animations, use of the drop box to store information and share it, as well as the use of commands on the computer keyboard.

According to the themes addressed, the teachers expressed different learning, among it can be found: the installation of programs to the computer, downloading of videos, creating of videos, which involved planning, filming and editing, as well as recording and audio editing, the use of PowerPoint presentations in different moments of instruction (beginning, development and closing), as well as audio and video integration.

Based on the content studied in the course, the teachers affirmed that they had obtained the following learning that allowed them to improve their mastery of ICT: Sharing videos and audios in the network (YouTube, Goear), the need to develop Search, innovate and create, recognizing that using technology can be fun but requires time investment, use of Excel to average student ratings and planning of learning activities (at each instructional moment) in the use of one or more technological resources.

5. Discussion

In this study, the satisfaction of the teachers of basic education was evaluated, regarding the course in B-learning mode; As a first result it was found that in the dimension "course design in its virtual modality", 81.8% of teachers mentioned being very satisfied and only 18.2% stated that they were moderately satisfied. With regard to the dimensions "course development in its virtual modality", "learning activities developed during the course" and "teacher performance during the classroom sessions", 100% of teachers said they are very satisfied. These results coincide with what Dominguez and Canto (2012) affirmed, in the sense that the contemporary teachers, work in a technological environment of teaching and learning, where they have to develop competences (digital) result of the influence that the context has about their professional task; This makes them appreciate the fact of being trained through courses that allow them to develop digital skills, to benefit the teaching and learning process. Likewise, the findings obtained from teachers' opinions regarding the implementation of the course, coincide with that mentioned by Valdés, Angulo, et al. (2011), in the sense that the incorporation of ICT in educational programs has acquired special relevance, under the assumption that these technological tools can promote a better educational quality and facilitate learning. In relation with was mentioned before, basic education teachers stated in the interview that the technological tools are useful not only because they allow the classes to be dynamic, but because they attend to the different learning styles; Now they can create resources according to the themes, maturity of the child and learning needs.

Another aspect to be highlighted is what Ramírez (2006 cited in Valdés, Angulo, Urías, García and Mortis 2011) points out, "the incorporation process of ICT by teachers in educational institutions has happened quickly, resulting in new demands for teachers ", this agrees with teachers' assertion that they, through the digital literacy course, had a significant learning in order to develop their own resources and develop their skills in the use of ICT; This allowed them to increase their interest to continue learning in an innovative way based on the implementation of technology. Therefore, this helped them a lot in their institutions, which day by day demands more as trainers of the basic level.

Finally, teachers expressed through their learning journals that the digital literacy course allowed them to develop their ICT skills, for example they mentioned that they could install programs to their computers without fear of damaging them, download and prepare educational videos, recordings and audio editions; Use PowerPoint presentations at different times of instruction (beginning, development and closing), as well as integrate audio and video into various educational projects; All this learning helped the quality of teaching. What was mentioned above is related to what Rodríguez and Gutiérrez (2011) point out, "it is urgent to integrate ICT into teachers' practice, in such a way that it not only benefits themselves, but that lay on academic achievement of students and, Therefore, on the quality of the teaching and learning process.

6. Conclusions

Based on the study carried out, some conclusions were formulated regarding the theme of the training of teachers of basic education regarding the use of ICT that are presented below.

In order to carry out a course for the training of teachers regarding the use of ICT, and in this case,

specifically in B-learning and Enciclomedia, it is necessary to make a needs diagnosis regarding the knowledge, skills and attitudes to have a solid basis that allow a good design, development and implementation of the course for the training of skills in the use of ICT.

The analysis of the context, including the educational policies, the framework of competences in ICT established by the organizations and in particular, by the SEP, as well as the characteristics of the institution, the educational policy of the school, the technological resources it has, teacher training, students' characteristics and infrastructure, these are elements that must be taken into account for the design, development and implementation of a course on the training of Basic Education teachers in the use of ICT. The theory and practice are elements that cannot be separated in the development of a training course in the use of ICT, since this creates a trusting environment between teacher and student, this result in safety and confidence of the student during the learning process.

In addition, in the design of the course in the educational platform must be clear enough, so that the work in it is simple, creative, has an internal logic and promotes in the student the interest in learning. It is necessary the incorporation of materials, resources, tutorials, readings, activities, relevant to the contents and the teacher's work.

When implementing a course in the B-learning modality, it is necessary to establish the means of communication between student and teacher for the resolution of doubts. In this sense, the dates, working hours and the delivery of tasks will be determined. Likewise, the participants' access to the Internet and the instructor must be corroborated. Before starting with the content of the course, it is necessary that the student identifies the usefulness of the course, the purposes, topics, strategies, activities, the tools that will use and the expected learning.

On the instructors, it is necessary to know the origin and purposes of the project and course; their academic training and work experiences; they must master aspects on the use of technology and its direct application to the educational field.

To conclude, this study had an impact on the different participants of the educational community. First, teachers were benefited by acquiring the tools for the development of skills in the use of ICT available to them at school, as well as the strategies to integrate into their practice.

Second, students having the opportunity to receive instruction with a different approach and taking an active role in class sessions, this helps them to improve their school performance; And lastly, to the managers, since they had at their disposal a training program directed to its personnel and according to its context.

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