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Implementation of information technology in Colegio de Bachilleres de Chiapas

Implementación de la tecnología de la información en el Colegio de Bachilleres de Chiapas

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Abstract

The present investigation focuses on the vicissitudes of the implementation of information and communication technology (ICT) in the 338 schools of Colegio de Bachilleres de Chiapas (COBACH) distributed throughout the state of Chiapas.

One of the precepts in higher secondary education is to incorporate the use of ICT in high school education in order to optimize and digitize the teaching-learning process. Pretension that implies to analyze in the first place the rural orography in which the school centers are located and in second moment the condition in which the teacher assumes such intention of the educational policy. In addition to the fact that today's youth in addition to receiving the knowledge of the adult generations incorporates the series of information and knowledge generated in social networks and the Internet to the point of building their personal learning environment (PLE) and virtual learning environments (VLE).

In this regard, data are presented at the diagnostic level on the subject of ICT in COBACH obtained through the methodology of the logical framework. This being the base for the projection of proposals to include in the six-year academic program of secondary education.

Information technology, Equipment, Internet service

Resumen

La presente investigación se centra en las vicisitudes que representa para el Colegio de Bachilleres de Chiapas (COBACH) la implementación de la tecnologia de la información (TIC) en los 338 centros escolares distribuidos en el estado de Chiapas.

Uno de los preceptos en educación media superior es incorporar en la educación de los bachilleres el uso de la TIC, a fin de optimizar y digitalizar el proceso de enseñanza-aprendizaje. Pretensión que implica analizar en primer lugar la orografía agreste en la que se ubican los centros escolares y en segundo momento la condición en que el docente asume tal intención de la política educativa. Adicional al hecho de que la juventud actual, además de recibir el conocimiento de las generaciones adultas, incorpora la serie de información y conocimientos que se generan en las redes sociales e internet, al grado de construir su entorno personal de aprendizaje (PLE) y ambientes virtuales de aprendizaje (AVA).

En tal sentido, se presentan datos a nivel diagnóstico sobre el tema de TIC en el COBACH obtenida a través de de la metodología del marco lógico. Siendo la base para la proyección de propuestas a incluir en el programa académico sexenal de educación media.

Tecnologia de la información, equipamiento, servicio de internet

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Introduction

This document describes the vicissitudes of the working group composed of staff from schools, zone coordinating offices and central offices of the General Directorate of the Colegio de Bachilleres de Chiapas (COBACH). At the initiative of the current authorities of the subsystem in question, activities began in February 2019 to shape the 2019-2024 institutional work programme, a diagnostic phase with nine lines of action: demand, coverage and quality; teaching skills; comprehensive training; institutional linkage; strengthening infrastructure and equipment; implementation of information and communication technology (ICT); administrative regulations and institutional evaluation.

For the construction of the diagnosis, the logical framework methodology (LFM) was applied in the participatory modality of the action research method.

To retrieve data from the different bodies involved, the IT unit created the "COBACH systems" platform specifically for this purpose. This was used to analyse and contrast the information provided by the different participants in order to configure the situational diagnosis of the sub-system in the aforementioned areas. In general, the situation of teachers and administrative staff in relation to their school, zone coordination and central offices and vice versa is highlighted. Of the nine axes, this proposal focuses on the description of the prevailing situation in the field of information and communication technologies in COBACH.

Justification

At present, there are 27 high schools at national level, as shown in the following table:

No.	State	Campuses
1	Baja California	41
2	Baja California Sur	11
3	Campeche	37
4	Chiapas	338
5	Chihuahua	28
6	Coahuila	10
7	Durango	33
8	Guerrero	54
9	Hidalgo	132
10	Jalisco	85
11	Estado de México	87
12	Michoacán	113
13	Morelos	23
14	Nayarit	50
15	Oaxaca	68
16	Puebla	37
17	Querétaro	59
18	Quintana Roo	48
19	San Luis Potosí	69
20	Sinaloa	124
21	Sonora	34
22	Tabasco	114
23	Tamaulipas	58
24	Tlaxcala	24
25	Veracruz	71
26	Yucatán	72
27	Zacatecas	40
	Total	**1,861**

Table 1
Source: State Baccalaureate Colleges (2019). Planteles y matrícula del formato 911. https://www.copeems.mx/

Of these, the state of Chiapas stands out for having the largest number of schools, a condition that becomes more complex if we add to this the orography in which the schools are located. Since the creation of COBACH in 1978 to date, it has registered an excessive growth with 338 schools, divided into 128 school campuses and 210 Higher Secondary Education Centres (EMSaD). The difference in the previous denomination lies in the fact that the latter do not cover an enrolment of 200 students. For the purposes of academic and administrative attention, this population is distributed in nine zone co-ordinations:

Coordination	School centres
Altos	44
Fraylesca Centre	32
North Central	35
Coast	49
Isthmus coast	27
North	34
Jungle	38
Northern jungle	24
Border highlands	55
Total	**338**

Tabla 2 Area co-ordinations

Each zone coordination is responsible for following up on the administrative and academic needs and interests of the staff in the total number of schools assigned, in accordance with the regulations set out in the curriculum map of the general baccalaureate with an educational approach based on the development of competences (DGB, 2018).

Problem

The incorporation of ICT in the teaching-learning process is an unavoidable requirement for education in the digital era, where teachers and students manipulate information flows and networks or multimedia environments (Vázquez, 2009), expanding the traditional scheme of physical interaction to a relationship with multimedia and search engines for information and knowledge on the network. However, such a claim, when massified in an educational subsystem such as COBACH, becomes complex as it has an extensive universe of schools that serves a staff of 3,323 teachers, 2,207 in school-based campuses and 1,116 in EMSaD Centres (COBACH. Department of Human Resources, 2019) for an enrolment of 85,496 students (COBACH. Department of School Control, 2019) and with a total of 8,333 computers, with internet service coverage in 171 schools, equivalent to 50.60%, without considering the quality of the service. In this regard, Agüero Servín, M., Álvarez, S. I. M., & Mansilla, M. P. (2022) point out the lack of access to technologies as one of the alarming difficulties in urban, rural and indigenous educational scenarios, which not only hinder teaching but also the achievement of the student's graduation profile. Given this scenario, it is a major challenge to implement information and communication technology in the scenario described. The advantage identified in the diagnostic phase is the daily use of mobile devices by students, a favourable situation for producing this resource for didactic purposes in the strategy developed by the teacher.

Hypothesis

The specific establishment of the detections in terms of equipment and internet service will allow us to suggest intervention strategies that will contribute to the implementation of ICT according to the needs of the teaching staff and students.

Objectives

General objective

To describe the current status of information and communication technology implementation in the subsystem with regard to IT assets, conditions of use and Internet service.

Specific objectives

Identify the number of computers in relation to the existing enrolment of students in the subsystem.

To identify the quality of the Internet service offered in the subsystem's schools.

Theoretical framework

In the global age of digitised information, access to knowledge is relatively easy, immediate, ubiquitous and inexpensive. One can access the information network, follow whatever line of enquiry seems appropriate, without the control of someone called a teacher. Also, one can participate in multiple networks of people and collectives that share interests, information, projects and activities, without time, institutional or geographical limitations.

The current system of life is an era of vertiginous change, of global interdependence that generates radical alterations in the way of communicating, acting, thinking and expressing oneself.

An example of this is what Bauman (2013) calls "consumer society", the omnivorous capacity of markets, their uncanny ability to profit from each and every human problem, be it anxiety, apprehension, pain or suffering.

Another feature would be the issue of "individuality". Bauman (2013) jokingly posits that, in a society of individuals, members are anything but individual, distinct or unique. They are strikingly alike, as they must follow the same life strategy and use shared signs to convince others that they do so. As far as the question of individuality is concerned, there is no possibility of individual choice. There is no "to be or not to be" dilemma to be solved in that sense.

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Returning again to the idea of the digital era, scientific advances are taking place at breakneck speed, particularly in the area of technology, the changes are abrupt, radical, characterised by speed as a characteristic feature of the liquid society referred to by Bauman (2013).

Derived from scientific advances, the term technology emerges as a central axis to be analysed. What is understood as such? According to Castells (2006), technology refers to the use of scientific knowledge to specify ways of doing things in a reproducible way. The information technologies identified include microelectronics, computing (machines and software), telecommunications, radio, television and optoelectronics, and genetic engineering, which focuses on decoding, manipulating and ultimately reprogramming the information codes of living matter.

A sociological argument for incorporating ICTs into the educational context in the life of the adolescent is referred to by Hargreaves (2005), that today's youth are surrounded and enveloped by images.

This makes traditional exposures of practical and local interest irrelevant, as sources of teaching and motivation for underachieving students, it is now common for any young person to enter into more meaningful contact with someone who lives hundreds of miles away than with their parents, sister or brother sitting next to them in their own room.

Visual images of technology are a pervasive feature of young people's lives. Textbooks, worksheets and projectors have little to do with these other, more complex, instantaneous and sometimes spectacular modes of experience and learning. In this context, it is not difficult to understand the lack of concern of many students about their curriculum and teaching.

Teachers are being forced to become increasingly competent in relation to this world and the surrounding image culture. This makes great demands on them, both in terms of technological awareness and pedagogical change.

From the above, ICT is particularly taken up as "the set of processes derived from new hardware and software tools, media and communication channels related to the digitised storage, processing and transmission of information, which enable the acquisition, production, processing, communication, recording and presentation of information, in the form of voice, images and data contained in signals of an acoustic, optical or electro-magnetic nature" (Duncombe Heeks, 1999, p. 2).

It can be said that they execute processes in order to generate, integrate and transmit knowledge that will subsequently have an impact on the ways of life of societies, not only in a technical or specialised field, but mainly in the creation of new forms of communication and global coexistence.

ICTs represent a fundamental element for the population, even from international decrees that establish the use of this technology as a central axis of the new educational models, which is why national public policy incorporates the use of information technologies in its recent reforms for better development and training of students. It is intended that students "use information and communication technologies to research, solve problems, produce materials and transmit information" (Instituto Nacional para la Evaluación de la Educación INEE, 2018, p. 66).

Article 8 of the Secretarial Agreement 480 states that schools must have libraries, laboratories, workshops and the necessary equipment for the development of the teaching and learning process, as well as the use of Information and Communication Technologies, in accordance with the modality in which the educational service is provided (Instituto Nacional para la Evaluación de la Educación INEE, 2018, p. 64).

"ICT can be used as didactic tools as they allow teachers and students to develop creativity, innovation and a collaborative work environment in which it is possible to share and disseminate information and raise discussions and debates that involve the school and the community and link them in a globalised environment" (Instituto Nacional para la Evaluación de la Educación INEE, 2018, p. 66).

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It is important to remember that the mission of the educational subsystem is to train young people at the upper secondary level, with a comprehensive education to contribute to their life project and its vision is to be an institution that meets the educational demand with quality and is identified as the best option, which undoubtedly implies the incorporation of technological tools.

An analysis is made of the implementation of ICT in the areas of the central office and school centres under the themes of computer assets and conditions of use, computer laboratory, professional profile of the staff in charge of the laboratory, teachers and administrative staff, digital classrooms, Internet service, platforms and digital libraries.

Computer assets are devices that make up a technological equipment in terms of hardware, which contribute to the teaching-learning process, according to the (Secretaría de Educación media Superior SEMS, 2008) "they constitute resources with an increasing value for student learning. As mentioned above, students must be able to use the different tools provided by these technologies to search for, process and analyse information". (p. 55).

Methodology of the research

The present research is descriptive in nature, focusing on the opinions of users of computer equipment and internet service at the level of teaching and administrative staff.

Type of research

Participatory action research or action research is a methodology that is distinguished by the way in which it approaches the object of study, the intentions or purposes, the actions of the social actors involved in the research, the different procedures that are developed and the achievements that are attained.

In terms of the approach to the object of study, the starting point is an initial diagnosis, the consultation of different social actors in search of appreciations, points of view, opinions on a subject or problem that is susceptible to change.

Latorre (2005) points out that this method differs from other research in the following aspects: a) It requires action as an integral part of the research process itself. b) The focus is on the values of the professional, rather than on methodological considerations. c) It is research on the person, in the sense that professionals investigate their own actions. The goals of the method are: to improve and/or transform social and/or educational practice, while seeking a better understanding of this practice; to permanently articulate research, action and training; to get closer to reality by linking change and knowledge; and to make teachers the protagonists of the research.

Likewise, the social actors become active researchers, participating in the identification of needs or potential problems to be investigated, in the collection of information, in decision-making, in the processes of reflection and action. In terms of procedures, focused discussions, participant observation, forums, workshops, roundtable discussions, among others, are shared. From the above, it can be concluded that participatory action research has very particular characteristics that distinguish it from other methodological approaches and make it more viable for transforming social realities.

According to Lewin (cited in Rodríguez, 1999) there are four characteristics of this method: cyclical, recursive, because similar steps tend to be repeated in a similar sequence; participatory, because those involved become researchers and beneficiaries of the findings and solutions or proposals; qualitative, because it deals more with language than with numbers; and reflexive, because critical reflection on the process and results are important parts of each cycle.

Theoretical methods

Logical Framework Methodology (LFM) as a planning tool based on problem structuring and problem solving that allows for a systematic and logical presentation of programme objectives and their causal relationships, aligned to inclusive objectives. The LFM is aligned with the budgetary norms for the Public Administration of the state of Chiapas according to articles 59 (Fractions II, VI, VII, VIII, IX, XII). The LFA is supported by both the problem tree and the objective tree, which allow for the construction of the indicator matrix (Ministry of Finance and Public Credit, 2016).

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Strengths, Weaknesses, Opportunities, Opportunities and Threats (SWOT) analysis matrix, which allows visualising external and internal factors. If SWOT analysis is applied to a programme or project, it is possible to identify external factors, under the quadrants of threats and opportunities, which can be useful to specify some assumptions.

Checklist format of IT assets and conditions of use, computer lab, professional profile of the staff in charge of the computer lab, teachers and administrative staff, digital classrooms, Internet service, platforms and digital libraries.

Results

It was identified that the Departments have technological equipment for the fulfilment of the administrative processes, and as a weakness, the deficiency and duplication in the communication between central offices, Zone Coordination Offices and Campuses.

On the other hand, the IT Unit is in charge of evaluating, determining and providing maintenance for the equipment in central offices.

In the schools, the existing computer assets are intended to serve an enrolment of 85,496 students. The AR02c indicator for upper secondary education suggests that for every eight students there should be one computer in the school (Robles V., 2013, p. 164).

The above data constituted the reference to elucidate on the subject of ICT in the Colegio de Bachilleres.

The following is a list of all the school campuses and EMSaD Centres, as well as the computer assets existing in the nine Zone Coordinating Bodies:

Equipment of computers, projectors and printers

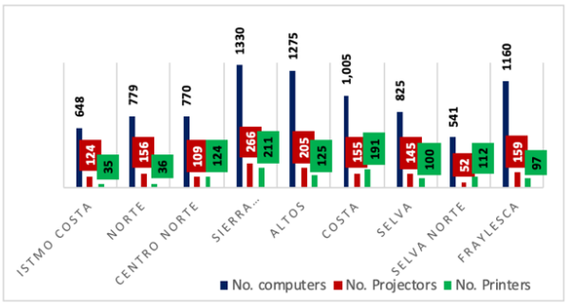

Figure 1 General Equipment by zone coordinations

The graph shows the IT equipment, consisting of computers, projectors and printers.

The Coordination of the Northern Jungle Zone has the lowest number of computers and projectors. It serves an enrolment of 7,148 students.

On the other hand, the Coordination of the Sierra Fronteriza Zone has the highest rate in this area, with an enrolment of 8,971 students.

The education authorities of the subsystem should focus on the transition from traditional teaching to the generation of virtual learning environments, as a process of the current information society.

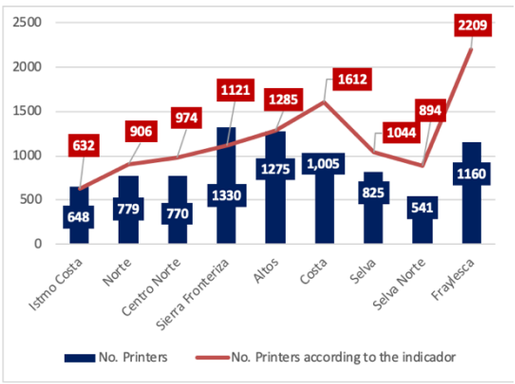

Figure 2 Number of suitable computer equipment per zone coordinating offices

The Coordination of the Sierra Fronteriza Zone complies with the number of computers it should have according to indicator AR02c (Robles V., 2013, p. 164), with 1,330 computers for an enrolment of 8,971 students, according to the number of students it should have 1,121 computers, it has a surplus of 209.

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The Coordination of the Fraylesca Central Zone has the lowest index with a total of 1,160 computers for an enrolment of 17,672 students with a shortage of 1,049 computers to meet the indicator. This is a constant feature in the rest of the Zone Co-ordination Offices.

In general terms, the number of computers available does not meet the number of students enrolled, hence the need to look for alternatives to solve this problem.

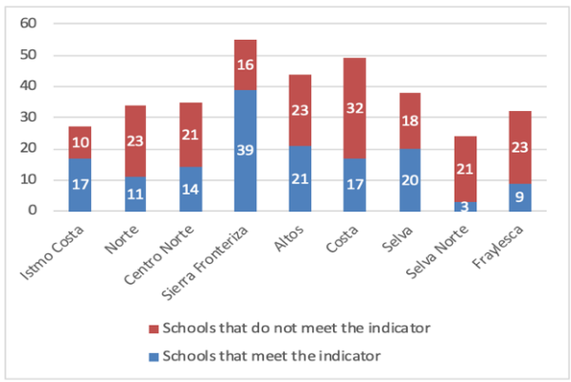

Figure 3 Number of campuses by zone coordinations that comply with indicator AR02c

In the Northern Selva Zone Coordination only three campuses manage to meet the indicator, while the Coastal Zone Coordination has the highest rate with 32 campuses that do not comply with the equipment.

The graph shows that more equipment is required to meet the goal proposed in Agreement 442 of the RIEMS, as only 44.67 per cent of the overall total meets the indicator in the subsystem.

Internet service

This service is a priority for teaching and administrative staff and for the entire student community in educational centres, as it allows access to information.

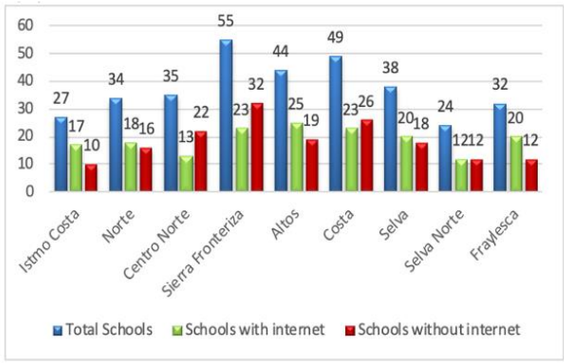

Figure 4 Number of campuses with Internet service by zone coordinating offices

Only 50.60 percent of schools have Internet access, regardless of the quality of service.

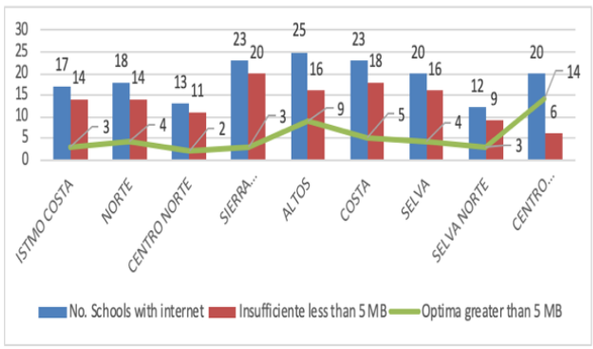

Figure 5 Number of campuses with optimal Internet service, by area co-ordination

Internet access is an essential tool that every educational centre must have in order to develop academic activities that help in the educational process. The optimum speed should be higher than 5 MB, which will allow adequate surfing of the net, and less than 5 MB makes it difficult to browse through the different pages of the net.

The graph indicates that 13.90 per cent, 47 educational centres, have optimal connectivity. It also refers to the inadequacy of this service in other schools, with poor navigation for users to access information.

Most of them do not have this optimal service due to the State's orography and the high cost involved. In schools and some EMSaD Centres this service is limited by the bandwidth of one or two megabytes and by the satellite connection (Mexico Connected) provided by the Federal Government.

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Condition of IT assets

From the campuses and Zone Coordination Offices, they report that the computer assets do not meet the hardware requirements (processor capacity, RAM memories, storage and connectivity units), and even present failures, in addition, they cannot be replaced due to lack of budget for equipment.

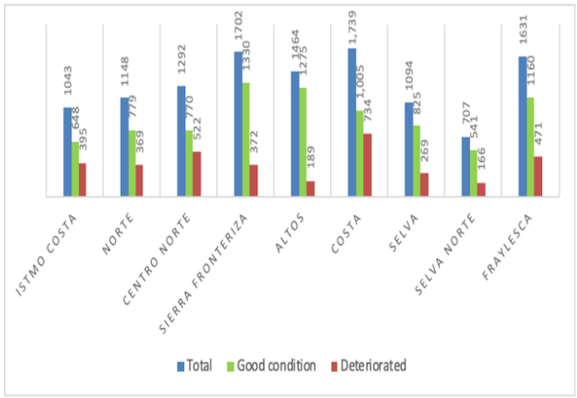

Figure 6 Computer equipment in good and bad condition, by zone coordinating offices

The total amount of computer equipment in all campuses is 1,820, of which 70.5 per cent is in optimal conditions. The graph shows that the Coordination of the North Central Zone has the least amount of equipment in optimal conditions.

Most of the computer equipment uses software for academic use; however, the budget allocated is insufficient to cover the requirements for antivirus licences, Office updates and others. Being a pending item to be attended.

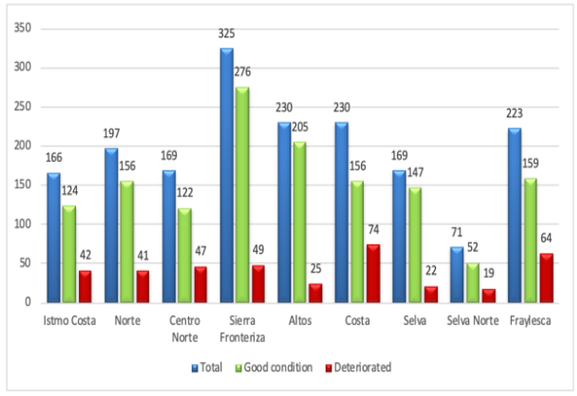

Figure 7 Projectors in good and bad condition, by zone co-ordinations

There are a total of 1,780 projectors distributed in all schools, 78.48 per cent of which are in optimal conditions. The use of the projector in the classroom is important for teachers and students to have a multimedia and interactive experience.

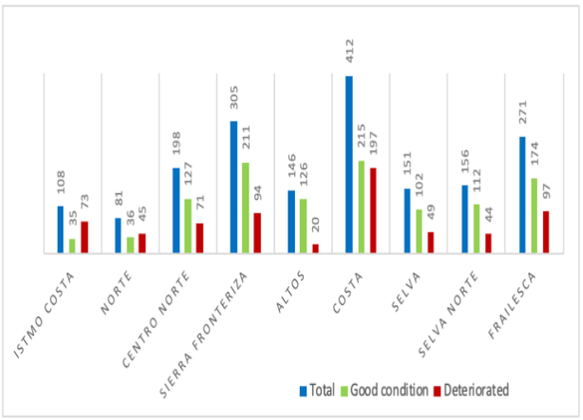

Figure 8 Printers in good and bad condition, by zone co-ordinations

A total of 1,828 printers are distributed in all schools, with 62.25 per cent in optimal conditions. Printers are important tools in the school process for high school students and are indispensable for administrative staff, therefore, it is necessary for schools to have this resource for better performance.

Types of computer labs

Within the system there are two types of laboratories: formal and adapted, the latter does not have the optimal conditions of installation and equipment.

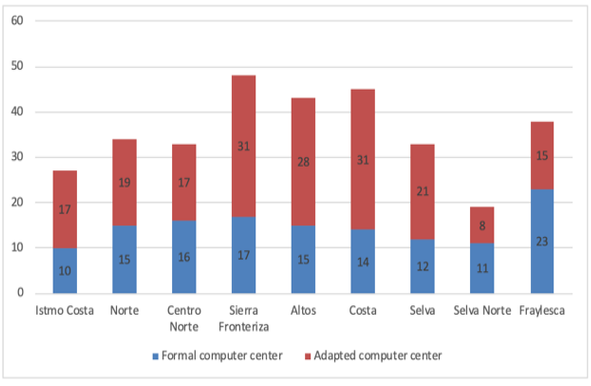

Figure 9 Formal and informal (adapted) laboratories, by area coordinations

The above graph shows that there are a total of 320 computer labs distributed across all campuses, of which 41.56 percent are formal.

Professional profile

It is the set of skills, abilities and competencies that a computer centre laboratorian must have in order to carry out the activities required and entrusted to him/her.

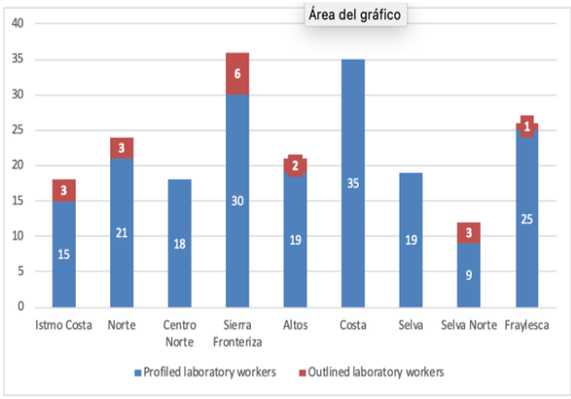

Figure 10 Laboratory technician with IT profile

Ninety-one per cent of the laboratorians have an IT profile, a condition that contributes to basic or preventive maintenance, characterised by cleaning, updating software and running antivirus programs.

With regard to corrective maintenance, it is the joint responsibility of the IT Unit and the area coordinating offices to schedule visits to the sites of the area coordinating offices to provide this service. However, the growth of the school makes it difficult to cover all the campuses due to the limited number of operational staff assigned to the task.

Conclusions

The diagnosis constitutes the initial part of any evaluation process or the start of any work proposal. It needs to be framed within a methodological process that guides and orients the phases that will make up the programme, project and work plan.

It takes on greater relevance and transcendence when the modality is participatory, at the same time as it requires individual and group commitment with a proactive attitude and above all that takes up and reflects the methodological and formative experience converging towards the same end, independently of personal paradigmatic positions.

In this sense, we began with the diagnostic phase of the COBACH academic programme in order to identify the series of problems and successes that characterise the work of administrative, management and teaching staff in central offices, zone coordinating offices and schools. In particular, the implementation of ICTs in the COBACH sub-system was described.

In the diagnosis, the vision of the actors involved was incorporated, not necessarily in agreement between the different instances, identifying this wealth of visions as responsible for the academic and administrative reality of the school life of the sub-system.

It is worth recognising that the quantitative growth of schools, the increase in the number of teaching and administrative staff has not necessarily been in line with the academic and administrative needs required by the baccalaureate for a comprehensive education. In the area of ICTs, the need to keep pace with this growth was evident: it is necessary to digitalise educational processes, improve equipment, and provide greater coverage and quality of internet service. In the case of communities with a high degree of marginalisation, it is utopian to think that this issue will be solved in the present administration; nevertheless, the strategy of incorporating the intranet modality to emulate the internet service was identified.

The "Planteles Vivientes" proposal has been identified and has been implemented in eighteen educational centres. Most of them are located in rural or marginal communities in the Central North, Isthmus Coast and North Coordination Units. It should be noted that in order to attend to each educational centre concerned, the immediate superior authority managed the support in notification letters for the Director involved so that the staff of the IT Collegiate could be absent from their work centre. Given that this activity was carried out on the members' own initiative, in some cases they received financial support in petrol from the director visited, using the teacher's personal vehicle or the vehicle of the Faculty of Human and Social Sciences of the University of Sciences and Arts of Chiapas.

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The diagnosis also identified the need to train, professionalise or specialise the existing human capital in the different educational spaces of the subsystem to incorporate the use of ICTs, as well as to break the institutional inertia characterised by a series of anachronistic and outdated practices.

More than 40 years after the founding of the College, the current social context of high school graduates with an individualised lifestyle sheltered in a consumer society, with family structures in transition, with personal learning environments in virtual learning environments, demand the rethinking and repositioning of what once constituted certainty for the College's working staff.

This is why it is so important to point out and specify the diagnosis in the work developed in this paper; making reality explicit or hiding it from our immediate gaze does not blur the reality per se that determines us without us necessarily being aware of it.

The reality encountered implies taking up again the strategies of collective work, working groups in a collegiate modality to attend to the context of the subsystem of the school. It places the working group in charge of the diagnosis and the current educational authorities in a different working scheme, assuming this position implies the responsibility of modifying what has been diagnosed. It requires transcending and moving from the traditional discourse to propositive and coordinated actions for the educational purpose framed in the new government's incipient educational proposal.

In order to achieve the previous precept, the working group needs to initiate methodological processes that allow it to break dogmas, ideologies and basic formative vices, since this puts us on the threshold of training the educational actors mentioned at the beginning of this paper.

It is necessary to identify that the educational theme is the one that unites us, and as such, from a philosophical point of view, it is an unfinished theme with ontologically undefined beings, under an institutional practice that needs to be reconsidered.

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