

# Valoraciones acerca de la colaboración en línea en estudiantes de posgrado en servicios de salud

## Assessments about online collaboration in postgraduate students in health services

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### RESUMEN

#### Palabras clave

Aprendizaje colaborativo, TIC, educación superior, aprendizaje

En los últimos años, la demanda de personal especializado en los servicios de asistencia en salud se ha incrementado; esto ha propiciado que los profesionales en esta área busquen alternativas de actualización que se adapten a los ritmos y las jornadas laborales de acuerdo con su contratación. El Instituto Universitario Veracruzano ha iniciado la Maestría en Administración de los Servicios de Salud en la modalidad en línea en cuyo modelo educativo se encuentran las didácticas de tipo colaborativo. El objetivo de este artículo es analizar las valoraciones acerca de la colaboración en línea en un grupo de 26 estudiantes del primer cuatrimestre de la asignatura en Sistemas y tecnologías de la información. El estudio fue de corte mixto: en lo cuantitativo, se aplicó un instrumento denominado Colab, con un índice de confiabilidad de Alfa de Cronbach de 0,87, y en lo cualitativo, se analizaron las consignas colaborativas realizadas en los foros de discusión. Los resultados señalan una aceptación favorable para este tipo de actividades, por lo que se concluye que los ambientes virtuales de aprendizaje resultan favorables para quienes tienen un horario laboral que les impide estudiar en la modalidad presencial. Asimismo, las didácticas aplicadas en el aprendizaje en línea les resultan favorables para el desarrollo de habilidades de colaboración.

### ABSTRACT

#### Keywords

Collaborative work, TIC, higher education, learning

*In recent years the demand for specialized personnel in health care services has increased, this has encouraged the professionals in this area to look for alternatives of updating that adapt to the rhythms and working days according to their recruitment. The Instituto Universitario Veracruzano has started with the Master's Degree in Health Services in the online modality. The objective was to analyze the assessments on the online collaboration of a group of 26 students of the first semester in the subject in Information Systems and Technologies. The type of study was mixed, for the quantitative part was applied an instrument called "Colab" with a reliability index of Cronbach Alpha of 0.87. For the qualitative part, we analyzed the collaborative slogans made in the discussion forums. The results obtained indicate a favorable acceptance for this type of activities. Finally, it is concluded that virtual learning environments are favorable for those subjects whose working hours prevent them from studying in the face-to-face mode. Also, the didactics applied in online learning, are favorable for the development of collaboration skills.*

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## INTRODUCTION

In Mexico, it is essential to have human resources specialized in health that meet the competence, quality and ethics expectations (Bárceñas, Ruiz-Velasco, Domínguez and Tolosa, 2015). In recent years, the demand for personnel specialized in health care services has increased. This has led the key stakeholders in this area to seek professionalization through updating alternatives that adapt to the pace and working schedules their work environment require; hence the difficult to attend training classes in formal institutions.

Health professionals, such as doctors, lab technicians, nurses, have opted for flexible learning environments, such as online learning (Margolis, 2012; Moya, 2012). This is confirmed in Molina, Valencia and Calle's (2009) paper that highlights the benefits offered by online learning, such as accessibility for workers with inflexible schedules or limited by space barriers. Online studies are attractive to professionals seeking ongoing personal development; hence, the change in the face-to-face education paradigm (Harrison, Gemmel & Reed, 2014).

Medical sciences courses related to health care services are on the rise, such as those offered within the e-Edumed project framework (Avramescu, Marius & Camen, 2016). The e-Edumed project updates skills and competences focusing on learning through the Internet, with asynchronous training materials and interactive modules for the interpretation of ultrasound results assisted synchronously through video conferences given by expert tutors in the field.

Molina, Valencia and Calle (2009) highlight the growing use of technology in health, which has generated a demand from doctors to improve their knowledge and management in the area of biomedical technology. However, the high costs of medical equipment and the shortage of technical personnel in hospitals have an impact on health care services. In this sense, Molina *et al.* (2009) designed an online course for the management and support of medical equipment given to 118 Peruvian and Colombian students; the results of this course have been satisfactory given the participants' acceptance of these distance learning courses.

This has led to a change in the teaching-learning process of the health sector pedagogies which are keeping pace with technological advances. An example of this is the study of human anatomy through online courses in which the dissection of corpses is taught through videos or by means of simulators, such as artificial bodies (Harrison, Gemmel & Redd, 2014).

Technological advances have allowed Internet publications of health contents in a variety of formats: text files, multimedia, interactive tools and virtual discussions, which have provided an opportunity for online learning. Mendoza (2011) points out that the World Wide Web has generated a passion for learning in the professional environment, at work,

at home or in recreational places. However, this requires formal methods that are easy to access for the personnel working in public health institutions (Molina, Valencia and Calle, 2009).

Lastly, Vázquez-Mata (2008) claims that the current medical practice differs from that of past decades, among which teamwork and multidisciplinary work stand out, the complexity of decision-making, the multiple sources of data to obtain information, in addition to the constant updating.

The purpose of this research is to analyze the assessments made by a group of students of the Master's Degree in Health Administration and Services taught by virtual mode who participated in asynchronous collaborative activities in a virtual classroom.

## CONCEPTUAL THEORETICAL APPROACH

Current technological advances allow adapting virtual learning environments (VLEs). A computer application allows the adaptation of pedagogical models that facilitate communication between the participants and the acquisition of knowledge with the support of a website. Hence, through a VLE, educational materials are distributed in digital format (text, images, audio and video) and interactive programs are offered such as chats, discussion forums and messages that make possible the participation and interaction of the members. Moreover, it functions as a management system that supports the monitoring and progress of the activities carried out by the participants. According to Boneu (2007), the main characteristics of a VLE are:

- Technological. This category is related to the specifications that the application has for the implementation of a VLE regarding the type of license, whether commercial or open source; the language support, which should preferably be compatible with the language of the participants; and the operating system and the characteristics of the technological equipment that the VLE platform will support.
- Pedagogical. Most VLE systems have tools and resources that facilitate communication and interaction between users through synchronous or asynchronous programs within the same platform. These allow the creation of interactive activities and the implementation of collaborative strategies. They also offer student monitoring and evaluation.

Training and continuous updating after undergraduate studies has benefited from the development of ICTs through VLE. The foregoing has contributed to the ubiquitous and almost instantaneous training process. In this regard, Capacho (2011) points out that the new economic profile

requires a new education in which the subject has maintain an active learning process.

In this sense, virtual training and updating play an important role, since, unlike face-to-face learning, in which the subject may or may not participate, in the virtual context he must be proactive at least in connecting himself to the server, which represents the learning space. Hence the relevance of VLEs that adapt to the teaching style. In other words, the learning process in VLEs requires psychological and pedagogical approaches that encourage the use of flexible, dynamic and collaborative tools, with training contents based on synchronous and asynchronous communication.

A VLE is systematically structured to be used online or distance learning courses. A virtual learning environment is an application consisting of information and communication technologies designed to facilitate teacher-student pedagogical communication in a teaching-learning process that promotes the self-construction of the educable subject (Bravo, 2012, p.6).

## **VIRTUAL LEARNING CENTERS**

Virtual learning centers are made up of a variety of educational institutions that offer learning, training and formation through the network. These institutions can be private or public and most of them are local, state, national or international universities with official recognition (Capacho, 2011). There are also institutions that offer programs without credits or certification, such as refresher courses or the so-called massive and open online courses (MOOC, English acronym).

According to Capacho (2011), it is difficult to identify a taxonomy in regard to the basic terms that have to do with virtual training processes. However, several authors have made conceptual approaches to virtual university, most of them based on e-learning. Rigo and Ávila (2009) point out that e-learning is an innovative approach to offer learning environments with access almost anywhere and at all times, digital resources are used, as well as the appropriate materials for learning in a ubiquitous way.

Roldan & Hervás' studies (2008) suggest that e-learning provides educational programs through electronic systems and transfers knowledge in such a way that it becomes a didactic means for participants to acquire skills and abilities that encourage their professional development.

Monteiro, Leite and Lima (2012) point out the advantages of *e-learning* in higher education, e.g., the potential to provide support materials, the reduction of travel costs and environmental impact. The additional benefit lies in the flexibility of the teaching platforms that adapt to the needs of each educational institution (Triana, 2016).

The design and implementation of virtual training processes in virtual educational centers require the application of virtual platforms, conceived as methodological tools for the application of *e-learning*, which, in turn, facilitates the adaptation of different methods and teaching didactics (Díaz and Castro, 2017). Hence, virtual platforms are conceived, at present, as important methodological tools for the training process in virtual spaces.

In summary, training in virtual learning spaces represents an opportunity for professionals to update and obtain the necessary competences for innovation, which goes beyond the distance and achieves the relevance of favorable scenarios for educational development:

Today, distance has a different meaning to the one it had in the last century. Distance means that each student learns at his own pace which does not have to match that of his classmates; he does it at his personal pace. Distance means an imaginary pace and space where everyone is an everyday and integrated element (Gros, 2011, p. 41).

Therefore, when the participants interact in virtual environments, the experience of their training is enriched and it facilitates the learning process from the access, adoption, adaptation and appropriation of resources and digital tools; these, according to the achievement of competences, will be part of their environment in the educational process.

Today, virtual education is conceived as a flexible learning modality, which breaks away from the paradigm of the temporality of space and time, and fosters the development of capacities for independent study, as well as the organization and disposition for the use of technology.

Therefore, the professionalization of the stakeholders in the health services represents a range of possibilities for their professional development, since, by being in interaction with other peers in their sector, they experience training and networking actions that form and transform their conceptualization of learning. Thus, beyond the characteristics and benefits of the Internet in regard to space and time, this provides the basis for online collaboration in VLE (Murua, Cacheiro and Gallego, 2014).

## ONLINE COLLABORATION

Virtual learning spaces are flexible and adapt to the didactics based on the different learning approaches. Online collaboration is based on collaborative learning and its foundations lie in Vygotsky's social psychology which, in turn, is based on the modes of social interaction presented in the learning process of the subject in his relationship with the other (Vygotsky, 1987). Traditionally, collaborative learning fosters the development of interpersonal communication skills that allow subjects to interact face to face, in an audiovisual exchange, in an onsite setting. Conversely, in a VLE, this interaction is materializes in the exchange of text and multimedia materials. Thus, online collaboration is conceived as a skill promoted by VLEs. Constructivist psychologists point out that the

use of collaborative tools such as discussion forums encourages virtual learning and develop cognition through argumentative approaches that are the result of social interaction (Vygotsky, 1987). On the other hand, from a psycho-pedagogical perspective, it is considered that online collaboration is based on constructivist and connectivist theories. In the constructivist theory, learning is considered as the process in which the student actively elaborates his own knowledge by understanding the didactic contents that are provided to him. In Mayer's words (2000), learning, from a constructivist perspective, "occurs when students participate directly in the construction of the active memory of a representation of knowledge" (p.156).

### *Collaboration Techniques and Strategies*

To carry out the online collaboration requires the design of didactics that promote social skills, teamwork, individual and group responsibility through the use of asynchronous and synchronous applications, such as discussion forums, chats, exchange of messages and mail (Cheng, Wang, Huang and Zarifis, 2016, Gutierrez-Porlan, Román-García and Del-Mar, 2018). In addition to the above, online collaboration can be developed through collaborative tools that allow reaching group consensus; however, a group must be heterogeneous and have no more than four participants. Likewise, collaborative work depends on the type of task; if the task is easy, group work will not be needed; conversely, if the task is complex, collaborative work can help achieve high levels of thoughts and make both the group and the student competitive (Capacho, 2011).

In this way, we can establish that online collaboration is based on three fundamental characteristics: interactivity, synchronicity and negotiation. The degree of interaction can occur between peers and is not defined by the frequency of interactions, but rather by the way in which said interactions can influence the cognitive process of the rest of the team members. The second element is synchronicity, a term that comes from the technological field in which communication tools are defined as synchronous or asynchronous. In order for collaborative work to take place, exchanges between peers in virtual classroom produced through dialogues sustained in the participation and interaction of the participants in a textual format are essential (Rosario, 2008). Moreover, interaction facilitates progress in learning, which requires a joint understanding of the subject being addressed. The above implies that the participants take into account what their "pair" understands in order for everyone to build a shared vision. To have an effective collaboration, new alternatives are necessary to rework ideas to communicate them and substantiate what is being expounded to others. Therefore, interaction is important for problem-solving and for the consensus of collaborative work.



In summary, collaborative interactions are also negotiable and are differentiated by the hierarchical situation; e.g., a participant does not impose his standpoint on the basis of his authority, but he rather negotiates stating his reasons and perspectives to try to convince his peers (Collazos and Mendoza, 2006). Hence, the structure of dialogues is expected to be more complex. This is also a process that develops gradually among the members of the team based on the concept of the mutual responsibility of each one's learning (Johnson & Johnson, 1997).

### *Related Studies*

In this section we present some research that give an account of the importance of online studies in the health sector, as well as the assessment of their success. Avramescu, Marius and Camen (2016), BarefieldCondon, McCuen & Sayles (2010) and Westbrook (2012) highlight the importance of training in the health sector supported in VLE. Likewise, the literature consulted indicates that online courses improve skills for problem-solving, decision making and the ability to work collaboratively.

In Cuba, distance education has been proposed as a viable solution for the training of the medical sector, in line with the information society. Rojas, Pérez, Torres and Peláez (2014) formulated a proposal in order to facilitate the access to information and knowledge in the national health system in the sense of joining the Infomed network with the intention of strengthening learning processes and contributing to the promotion of self-learning. At present, this network is considered as the inter-university space for online learning of the Cuban medical education.

In Romania, Avramescu, Marius & Camen (2016) developed an online course for ultrasound training for nurses. The training was carried out on the e-Edumed platform. The educational content consisted of six units, which included 126 images, 335 PowerPoint sheets, 10 virtual classes and 80 questions.

The results of the study reveal that the third dimension images reinforced the theoretical knowledge acquired. On the one hand, the forum tool facilitated the exchange of information with peers and fostered bidirectional communication as well as reciprocity and collaboration among the participants.

At the virtual learning center pertaining to the United Kingdom, Harrison, Gemmel & Reed (2014) carried out a study aiming at evaluating the satisfaction of a group of students of a doctorate degree in public health. To this effect, they designed an innovative pedagogical practice in the Dissertation course; the doctoral students prepared during twelve months, relying on the virtual classroom. They also made use of technological tools such as forums and chats. The results indicate 85% satisfaction of the innovative proposal.

In Mexico, the educational offer of the School of Public Health stands out, as do other institutions of higher education, such as the Universidad Nacional Autónoma de México (UNAM, [Spanish acronym for National Autonomous University of Mexico]), the Instituto Politécnico Nacional [National Polytechnic Institute] and the Nodo México del Campus Virtual de Salud Pública [Mexico Node of the Virtual Campus of Public Health], which houses more than twenty public education and health institutions, with an increase of enrollment due to the demand for virtual courses (Magaña-Valladares, Suárez-Conejero, Hernández-Ávila and Gudiño-Cejudo, 2014).

At the UNAM, Bárcenas *et al.* (2015) installed a cybertronic laboratory where professors of the undergraduate level in nursing of the public health sector in Mexico initiated their first contact with the information and communication technologies (ICTs). The objective of the research focused on two aspects: acquiring basic knowledge in the use of ICTs and obtaining the appropriate level to enter the training programs and online teaching updates. The main activities were the exchange of files on the platform, as well as the sending and receiving of messages through the Moodle platform. The laboratory used resources for collaborative work such as chats, videoconference and forums. Among the academic subjects, they emphasized thanatology, prevention, stress control, diabetes, geriatrics and other infirmity aspects.

In this paper, we present the perspectives of virtual training from a professional's perspective in the health sector, and our scenario is the master's degree in Health Systems Administration of the Instituto Universitario Veracruzano [The Veracruzano University Institute]. Our objective is to rescue the experiences of the virtual training of a group that studied the first semester of Systems and Information Technologies.

## MATERIALS AND METHODS

The Instituto Universitario Veracruzano [The Veracruzano University Institute] offers several courses, among which permanent updating through its academic programs of continuous training stands out. In our study, we selected the group of the online Master's Degree in Health Services Administration, and our scenario was the Systems and Information Technologies course, which didactics are based on individual and collaborative learning.

### *Objective*

Analyze the assessments about collaboration in the online training process of health services professionals.



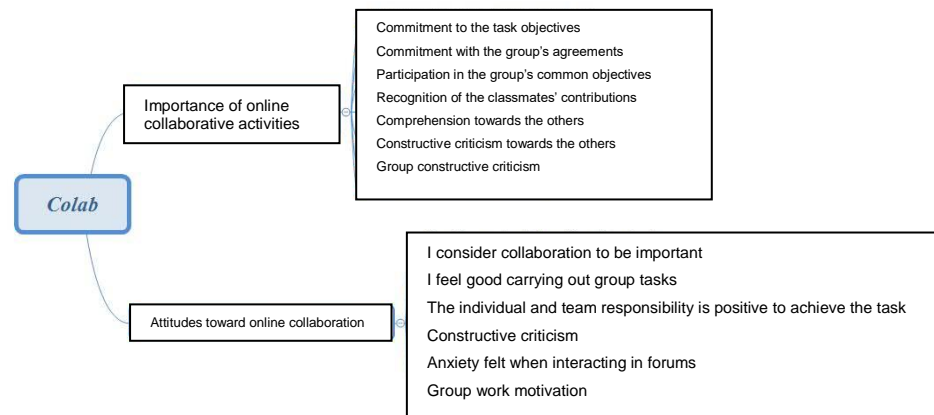
### Type of Study

This research methodological development was mixed. The quantitative data collection technique was carried out by means of a survey aiming at knowing the participants' assessment of the collaborative activities. To supplement the qualitative part of the study, we conducted an analysis of the forums that seek deepening the interpretation of the results obtained of the assessment of online collaboration.

The criterion of the sample was defined as non-probabilistic and determined at convenience; in order for the analysis of collaboration to be considered relevant, the groups had to be small and relevant to the study (Hernández, Fernández and Baptista, 2010). The sample consisted of 26 students.

### Instruments

The applied instrument derives from the line of research related to collaboration in VLE. The instrument was developed by Soto and Torres (2016) and has been applied in other studies on the same topic. The instrument supplied is a Colab questionnaire, which consisted of four items of personal identification and 16 items grouped in two dimensions (perception and attitude) to analyze the participants' assessment of collaborative work. We use a four value Likert scale: determinant, significant, little and null, built according to dimensions and indicators (See Figure).



**Figure.** Dimensions and indicators of online collaboration.

### *Reliability Analysis*

The reliability of the instrument was determined by Cronbach's alpha coefficient for each dimension: (0.823) for the perception towards collaboration, (0.831) for attitudes toward collaboration, and 0.870 Cronbach coefficient for the questionnaire. The consistency indexes were quite acceptable and ranged from 0.8 to 1, given their high level, they indicate a good reliability index (Bisquerra, 2009). The instrument was designed in Google Forms and was applied at the end of the semester; this allowed knowing the assessment regarding the implementation of the didactic activity. It is worth noting that we told the students that this survey would not be used to assess their grades.

In the qualitative data analysis, we examined the discourse coming from the discussion forums and we interpreted it by using the QDAMinerLite tool. This process involved the stages of data preparation, initial analysis and results. For the preparation of the data, we relied on the open coding procedure based on Soto's study (2014) and we included the categories of positive interdependence, communication skills and information exchange.

### *Didactic Activities*

The virtual educational model of the Instituto Universitario Veracruzano is based on the approach of socio-cultural constructivism, in which teachers and students actively participate in collaborative work situations that fosters negotiation through explanations, agreements and disagreements, which, in turn, stimulate cognitive mechanisms through the virtual space for the generation of learning (Mayorga and Ramos, 2016).

The final objective of the course is to provide knowledge about information systems and technologies grouped into four major topics divided into six classes: a) fundamentals of information systems; b) information technology; c) applications of information technology; and d) administration of information technology. Each topic included the objectives, the consultation materials, scoring guide, the forum for dispelling doubts and discussion forums, as well as the space to upload the instructions for the assessment of each topic.

In regard to the course assessment, we qualified the works submitted, the attendance to the virtual classroom and the participation in the forums by means of an assessment rubric. The description of the modules, the modality and the didactic used are shown in Table 1.

The collaborative activity focused on the interaction in a discussion forum that grouped the members into teams of three or four persons at the most. The groups were formed randomly by alphabetical name list; e.g., the one that began with the letter "A", the intermediate one with letter "M" and the

last one with letter "Z", and so on until the teams were formed. The interaction space was given in the forum, which had three stages: a technology (networks, services and terminals) was assigned in the first stage; the participants had to write a text directly in the forum and mention all the didactic activities they would use in the institution where they worked and how they did it. Likewise, they would point out the advantages and disadvantages they found when using them.

**Table 1.** Topics seen in the course

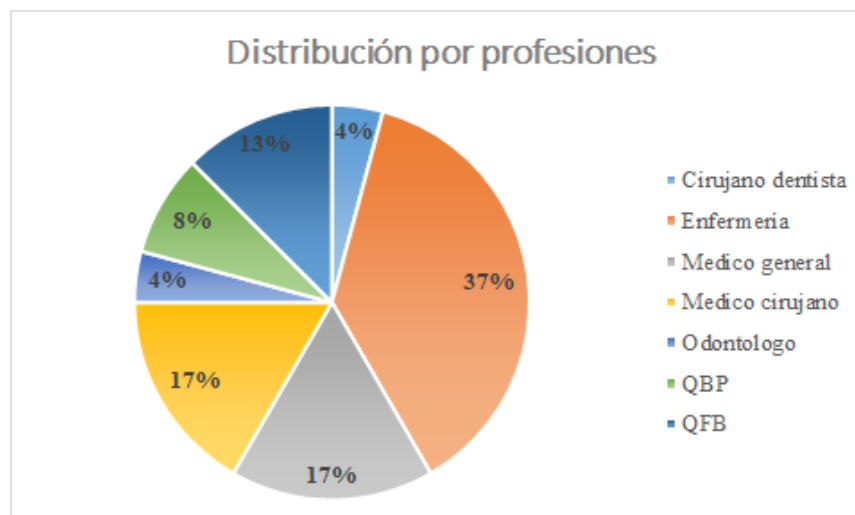
Topic	Name	Approach	Didactic used
1	Information systems bases	Individual	Class, participation in forums, carrying out instructions
2	Information technology	Collaborative	Class, participation in forums, carrying out instruction
3	Information technology applications	Collaborative	Class, participation in forums,
4	Information technology administration	Individual	Class, participation in forums, presentation of final project

Source: Self development.

At a second stage, they had to retake all the technologies they had shared and prepare a PowerPoint presentation that would rescue the following points: technology, use, advantages and disadvantages. Lastly, at a third stage, they had to comment on at least two presentations that had caught their attention and state the reason.

## RESULTS AND DISCUSSION

The information obtained, according to personal data, indicates that the participants completed a degree related to the biological and health sciences. Figure 1 shows that 37% corresponds to the nursing profile and 17% to the general practitioner and another 17% to the surgeon.

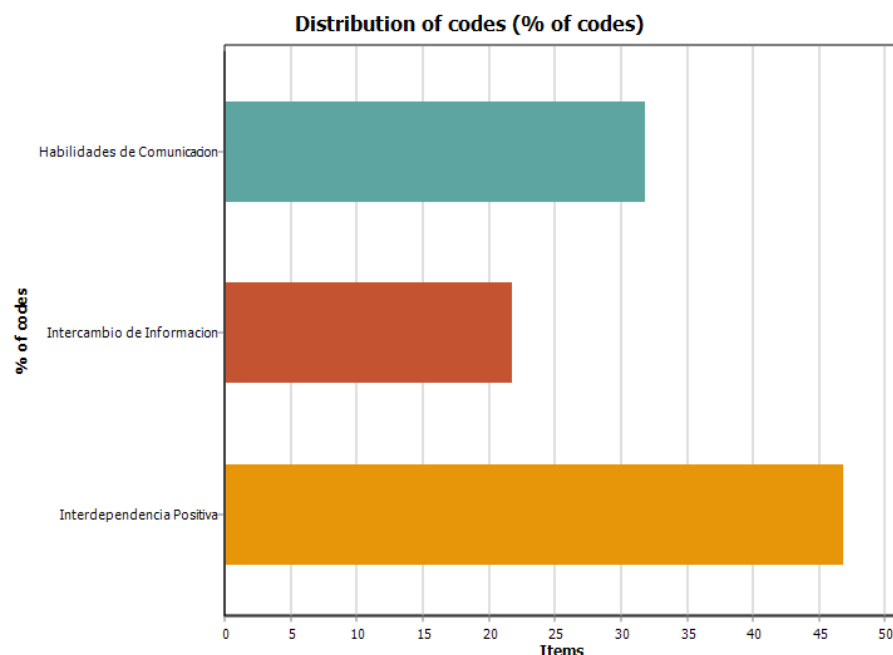


**Graph 1.** Distribution of the professions within the group.  
Source: Self development.

In regard to the results of the Colab instrument on the dimension of the importance of the activities based on collaborative work, the means obtained indicate that the carrying out of the instructions and intervention in the forums were acceptable; the highest average 3.7200 (See Table 2) was for the indicators of commitment to the objectives of the task, the recognition of the contributions of others and the ability to understand the resolution of tasks.

In relation to the qualitative analysis (See Graph 2), the dimension of positive interdependence was highlighted. From the psychological point of view, Johnson and Johnson (1997) point out that positive interdependence is the first and most important element of collaborative learning. It requires the establishment of a clear task and a group goal so that students are convinced that, if one fails, all fail.

Our findings confirm the presence of the information exchange indicator. In this regard, Johnson and Johnson (1997) say that this activity promotes the collective construction of knowledge. The central aspect is not that the students perform a task, but that they achieve significant learning jointly.



**Graph 2.** Distribution of the online collaboration codes.  
Source: Self development.

The above is exemplified by the speeches presented in the discussion forums: "In reviewing the presentations that have been shared so far in the forum, I believe that having a bibliography and sources of information in common we agree on most of the advantages and disadvantages of each one of the technologies that we have analyzed in our presentations "(A12), as well as the feedback from your partner:" I have reviewed your presentation and just like my partner and all of us, we agree that one of the difficulties of technology is computer insecurity; however, the advantages are impressive: less time, more information, more accessibility "(A20).

**Table 2.** Means obtained regarding the importance of collaborative work.

To was extent are the following aspects of collaborative work important?	Mean	Standard deviation	Variance
Commitment to the objectives of the task	3.7200	.45826	.210
Commitment to the group's agreements	3.6000	.57735	.333

<b>Participation in the group's common objectives</b>	3.6000	.57735	.340
<b>Recognition of the others' contributions</b>	3.7200	.54160	.210
<b>The change of role allowed me to understand the task diversity</b>	3.5600	.58310	.340
<b>I feel capable of understanding others in solving tasks</b>	3.7200	.5461	.293
<b>Constructive criticism allowed me to understand others' different standpoints</b>	3.2800	.73711	.543
<b>Constructive criticism allowed us to improve the task</b>	3.5600	.58310	.340

Source: Self development.

In reference to the 3.2800 lowest mean about the constructive criticism made by the other colleagues, which indicates a medium level in terms of acceptance of criticism and advice from the group. This is expressed in the comment of one of the students:

Good afternoon, as closure to my participation, I conclude that in general, each one of the contributions and feedback of the presentations I observed are very consistent with one another and, in our conclusions, we all believe in the importance of technology and what it has brought into our lives, the findings that help extend our life expectancy through new treatment systems and diagnosis that already exist, among others, that facilitate our day to day at work, at home and in our vehicles (A6).

In regard to attitudes toward online collaborative work according to the means obtained (See table 3), the 3.6800 high mean highlights the fact that participants feel comfortable collaborating with their peers. A participant explains his opinions about the collaborative work carried out in this course (A9):

It would be redundant to speak about the benefits and prerogatives of the collaborative work carried out on the topic of technologies since we have addressed and outlined them very well in this forum, however, in conclusion, I believe that the conjunction and use of all of them in our day to day life and in our workplace will allow us to make the most of the potential of these tools without one being more important than the other, but each one takes its relevance at one moment or the other, and it is our duty as professionals to assess the specific moment and adequate use of each one of these technologies (A9).



**Table 3.** Attitudes toward online collaborative work.

Attitudes toward online collaborative work	Mean	Standard deviation	Variance
I consider online collaborative work to be important for my current learning	3.4400	.58310	.340
I feel at ease collaborating with my peers	3.6800	.55678	.310
Individual and team responsibility is positive to perform the task	3.6000	.75719	.573
Group criticism help me improve my contributions	3.4000	.91287	.833
Interacting in forums makes me anxious	1.4400	.71181	.507
I believe it is advisable to introduce online collaboration in teaching	3.4800	.77028	.593
I'm motivated by team work, I always learn from the experiences of others	3.6000	.50000	.250

Source: Personal development.

The second 3.600 high means highlight the motivation for group work and emphasize individual and team responsibility for the achievement of the task. The above can be seen in the comments of one of the participants, who also liked virtual learning: "Hi, partner. I liked your presentation and I everything related to e-learning gained my attention, which is what we live in the Virtual University, I think the advantages and disadvantages (A3) are in agreement".

The students comment on the contributions made in the forums:

I agree with you, collaboration on the medical area plays a super important role; on the other hand, technology makes our life easier, in regard to procedures, consultations, studies, communication, information transmission and reception, etc.; on the other hand, thanks to the technology shown in devices for studies, surgeries, nanotechnology, etc., it has facilitated the attention to the beneficiaries, giving them a better quality of life, timely detection of certain ailments, and

including, a better and quicker recuperation since treatments are less invasive (A11).

Obviously, the online collaboration in the forums is a space to develop these skills in students given the interactions in the virtual space.

## CONCLUSIONS

The permanent updating of human resources in the health sector is fundamental. However, the gap between the working space and time to take courses or pursue postgraduate studies is hardly bridged for most of the workers in this sector. This has been compensated by flexible learning environments, including courses in virtual modality, which are increasingly booming in Mexico thanks to the use of technological resources, e.g., the Internet as a communication channel.

It is feasible for educational institutions related to health sciences to bet on courses and postgraduate studies in the virtual modality that promote skills that are really necessary today such as collaborative skills. The results of this research highlight the acceptance of didactics aiming at the participants' collaboration. By fostering interaction in discussion forums, argumentative skills are also strengthened through the participants' own texts and those of the virtual classmates, in which they interpret, propose, refute, question or agree with the statements made by their companions; likewise, communication and social skills are fostered with the exchange of cordial messages, and decided by consensus of the group the instructions to reach the common goal.

The above is consistent with Elizaphan, Peter, Oboko and Kihoro' statements (2014), in the sense that online collaboration in VLE generates the collective development of knowledge by activating social communication skills, as well as the motivation to interact with others in the construction of learning by developing common goals.

By way of conclusion, virtual learning spaces are gradually consolidated as a flexible alternative for the professionalization of workers in the health sector, who, due to work issues, find it difficult to access face-to-face training (Taina, Marius & Camen, 2016). We can also affirm that virtual learning spaces promote the collective construction of knowledge by presenting appropriate didactics, which strengthens the ability of online collaboration.

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