Revista Iberoamericana para la Investigación y el Desarrollo Educativo
ISSN 2007 - 7467

https://doi.org/10.23913/ride.v14i28.1755

Scientific articles

Facebook: recurso didáctico para lograr el aprendizaje colaborativo en el ámbito universitario

Facebook: didactic resource to achieve collaborative learning in the University environment

Facebook: recurso didático para alcançar a aprendizagem colaborativa no ambiente universitário

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Resumen

El objetivo de esta investigación fue determinar la presencia del aprendizaje colaborativo al utilizar Facebook en la asignatura Taller de Ética en el Instituto Tecnológico de Estudios Superiores de Los Cabos (ITES Los Cabos), extensión Cabo San Lucas. El diseño metodológico se estableció de corte cualitativo para estudio de caso. La recolección de datos se llevó a cabo mediante la observación participante y entrevista. Las participaciones fueron analizadas bajo las siguientes dimensiones: social, participativa, interactiva, cognitiva y metacognitiva. Se creó un modelo didáctico en el que convergieron elementos tales como currículo, plan de estudios, estudiantes, herramientas de la Web 2.0, Facebook, grupo de Facebook, facilitador como mediador y modelo de Henri, lo que permitió identificar la existencia del aprendizaje colaborativo. El análisis de cada actividad mostró la presencia de las siguientes dimensiones: social y participativa, ya que los estudiantes participaron en todas las actividades de aprendizaje; interactiva al interactuar entre ellos; cognitiva y metacognitiva al opinar y reflexionar sobre los distintos temas elegidos y según su experiencia. Se concluyó que el aprendizaje colaborativo fue favorecido por el uso de las herramientas ya descritas.

Palabras clave: curso universitario, enseñanza asistida por ordenador, estrategias educativas, medios sociales, tecnología de la información.

Abstract

The main purpose of this research work is to determine the collaborative learning presence on Facebook in the Ethics Workshop course at the Instituto Tecnológico de Estudios Superiores de Los Cabos (ITES Los Cabos), at the Cabo San Lucas extension. The case study is based on qualitative measurements. Data collection is performed by observation and interview methods. The collected data is analyzed under the following criteria: social, participative, interactive, cognitive, and metacognitive. A teaching model is created such that curriculum, students, Web 2.0 tools, Facebook, Facebook groups, mediator groups, and the Henri´s model are part of the interaction. These allow to identify the collaborative learning. By supervising the teaching activities, we can identify the following point of interest: social involvement, given that all students interacted in all learning activities, cognitive and metacognitive since the students give their thoughts regarding the selected topics based upon to their experience. It is concluded that the join learning takes advantage of the aforementioned resources.

Keywords: University courses, Computer assisted learning, Educational strategies, Social media, Information technology.

Resumo

O objetivo desta pesquisa foi determinar a presença de aprendizagem colaborativa ao usar o Facebook na disciplina Oficina de Ética no Instituto Tecnológico de Estudos Superiores de Los Cabos (ITES Los Cabos), extensão Cabo San Lucas. O desenho metodológico foi estabelecido como um estudo de caso qualitativo. A coleta de dados foi realizada por meio de observação participante e entrevistas. As participações foram analisadas sob as seguintes dimensões: social, participativa, interativa, cognitiva e metacognitiva. Foi criado um modelo didático no qual convergiram elementos como currículo, plano de estudos, alunos, ferramentas Web 2.0, Facebook, grupo do Facebook, facilitador como mediador e modelo Henri, o que possibilitou identificar a existência de aprendizagem colaborativa. A análise de cada atividade evidenciou a presença das seguintes dimensões: social e participativa, uma vez que os alunos participaram de todas as atividades de aprendizagem; interativos ao interagir uns com os outros; cognitivo e metacognitivo ao opinar e refletir sobre os diferentes temas escolhidos e de acordo com a sua experiência.

Concluiu-se que a aprendizagem colaborativa foi favorecida pela utilização das ferramentas já descritas.

Palavras-chave: curso universitário, ensino assistido por computador, estratégias educacionais, mídias sociais, tecnologia da informação.

Fecha Recepción: Julio 2023 **Fecha Aceptación:** Diciembre 2023

Introduction

According to the Digital 2020 Global Digital Overview study, carried out by the companies We are Social and Hootsuite (2020), by January 2020 Facebook had 2,449 million active users in the world. This study also mentions that 44% of the potential reach of Facebook ads reaches women and 56% reaches men. Likewise, 32% of people in the world over the age of 13 access Facebook.

On the other hand, the National Survey on Availability and Use of Information Technologies in Homes [ENDUTIH] of the National Institute of Statistics and Geography [INEGI] (2021) indicates that in Mexico during 2020 there were 44.4 million people aged six and more than used a computer and 84.1 million connected to the internet, mainly to communicate (93.8%), search for information (91.0%) and access social networks (89.0%).

Currently, information and communication technologies (ICT), particularly social networks, are used in the transmission of information of all kinds, including the acquisition of knowledge by students at various school levels from primary education (Mato and Álvarez, 2019; Reye s-Chávez and Prado-Rodríguez, 2020), upper secondary (Moya, 2018; Ramírez, 2021) and higher (Rodríguez and Kriscautzky, 2018; Tirado and Roque, 2019; Terreros, 2021), which It serves as support to propose new strategies that promote teaching-learning processes.

Social networks as a function of ICT have evolved to such a degree that they have become a valuable resource to achieve student learning, since they allow them to work collaboratively. This, without a doubt, increases motivation to learn and favors greater academic performance, since feedback occurs between individual and group learning. In addition, it serves to improve the retention of what has been learned, enhance critical thinking and multiply the diversity of knowledge and experiences acquired (Marín and Cabero, 2019; Martínez-Salas and Alemany-Martínez, 2022).

In this context, Castro and González (2016) point out that the Facebook platform can be a space to complement classroom activities, delve into different approaches and methodologies related to the subject, as well as promote critical thinking and increase motivation. Indeed, the use of Facebook in higher education allows supporting the teaching-learning process and developing

cognitive-technological skills that benefit all students to achieve the objectives proposed in the curriculum (Abúndez *et al*., 2015).

In this same sense, López de la Madrid *et al*. (2017) affirm that Facebook can have significant potential to enrich educational processes, as long as teachers, students and administrators make conscious and directed use of this network. In this regard, Gómez-Hurtado *et al.* (2018) they think:

> Facebook has become a leading network within innovative experiences in Higher Education, either due to its positive results in improving the development of teaching-learning processes through didactic strategies of virtual peer tutoring or through a overall growth of students at an academic, social and personal level (p. 103).

The same authors admit that one of the most important uses of Facebook regarding the opinions of students and teachers is tutoring with the teacher and among peers. This social network has allowed students who had no relationship to help each other, and for the teacher and the student to exchange analysis, information searches, etc., through resources such as the electronic portfolio, which promotes collaboration, research and discussion (Chugh and Ruhi, 2018).

Now, in the specific case of the pedagogical practices implemented at the Technological Institute of Higher Studies of Los Cabos, these are framed in the educational model for the 21st century, that is, training and development of professional skills that guide university work with in order to solve the current needs of the context in which technological education is developed. To do this, the economic, social, and cultural part is also taken into account, since it is understood that there are changes derived from ICT and scientific and technological development.

This model is based on three essential dimensions of the educational process: philosophical, organizational, and academic. The latter assumes the construction of knowledge from meaningful and collaborative learning where mediation, evaluation and practice are fundamental for the development of acquired skills (General Directorate of Higher Technological Education [DGEST], 2012).

In the case of the Ethics Workshop subject, among the transversal competencies to be achieved, collaboration and the ability to relate with professionals from other areas are considered, as well as the self-critical and critical exercise of ethics.

Collaborative learning (CA), from a sociocultural perspective, presents the interaction between students who together share, negotiate and construct meanings to address and solve problems. Therefore, it is recognized as a creative and reflective methodology alternative to

individual methods, since it promotes interaction between equals (Coll and Monereo, 2008; Guerra *et al.*, 2019).

In the computational field, computer-assisted collaborative learning has been studied. In this regard, Muñoz-Carril *et al.* (2021) comment that this occurs when technological, pedagogical and social elements are integrated in a course where students take advantage of their prior knowledge to learn with others. This promotes student satisfaction, mutual support, commitment, group membership, and mediation by the technology-supported facilitator.

In that sense, Silarayan *et al*. (2022) consider that Facebook, in the educational field, is a virtual network that offers students a horizontal space, since it allows them to participate freely, stable and without pressure. Furthermore, in the university field, for Delgado-García *et al*. (2018), this pedagogical tool constitutes a proposal in teaching-learning to establish interaction between users in different virtual communicative contexts.

Salazar and Ñañez (2021) indicate that it is an effective tool for the teaching-learning process because it offers an egalitarian space and develops socialization, collaboration and interaction between its participants. In other words, this instrument not only enables students to achieve assertive interaction, but also offers learning spaces.

On Facebook the presence of the student and teacher roles can be observed, where the latter serves as administrator of the learning space. In this regard, López de la Madrid *et al*. (2017) point out that "the most frequent actions that teachers carry out on Facebook concern communication, whether between peers, with students or with directors and administrators, to exchange opinions, give instructions to students, or discuss topics and resolve doubts about the subjects" (p. 144).

Having explained the above, it can be indicated that the objective of this research was to determine, based on a computer-based learning model, the capacity of Facebook to promote collaborative learning as a teaching resource in the Ethics Workshop subject, in the degree program. of Engineering in Administration from the Technological Institute of Higher Studies of Los Cabos, Baja California Sur, México.

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Materials and methods

This work was based on the case study for qualitative research, since it sought to understand the relationships established in the environment studied to determine the presence of collaborative learning (Stake, 2010). In the case study, the sample is usually intended to be intentional to determine greater in-depth details (Simmons, 2011). For this reason, we worked with 27 students who were members of group 2IA-02M in the Ethics Workshop course, located in the second semester of the Administration Engineering degree in group 02 morning. As an intentional sample, it was determined to choose three of them (cases) based on their academic performance during class (Vasilachis, 2019).

Among the data collection techniques, in-depth interviews and participant observation were established; The latter focused on analyzing the interventions through documents, publications, comments and messages, which allowed us to know details about the behavior of the students when interacting with the technology, as well as the interrelation between them in the classroom, the Facebook wall and your group chat. This type of observation allows the researcher to participate in the events (Cruz, 2007, cited by Restrepo, 2022).

In the in-depth interview, information was collected about opinions, meanings and events that occurred in the field environment related to the use of Web 2.0 tools planned in the subject. This interview functioned as a source of information that, prior to the investigation of events that had not been observed, allowed for the identification and analysis of themes. In addition, it was flexible, since it encouraged the participation of the researcher, was easy to document, and was applied via the internet through Google Forms (Vasilachis, 2019).

Procedure

Prior to the application of the data collection instruments, the categories that would be used for the analysis of the students' interactions were defined (table 1).

Table 1. Participant observation analysis categories

Cases	Contributions in the Facebook group	Categories/dimensions
Case A Case B Case C Student D Teacher I	Holdings Comments Interactions	Participatory
		Interactive
		Social
		Cognitive
		Metacognitive

Source: Own elaboration (model from Henri, 1992)

The cases were presented as follows: case A: female student (19 years old) of high academic level. Case B: female student (21 years old) of average academic level. Case C: male student (20 years old) of low academic level and, finally, student D. For this last designation, the rest of the students in the group (11 men and 13 women) were considered, who were not selected as cases, but attended to the classes of the Ethics Workshop subject and carried out the activities. For the interview, the study segments, purpose and type of analysis were established (table 2).

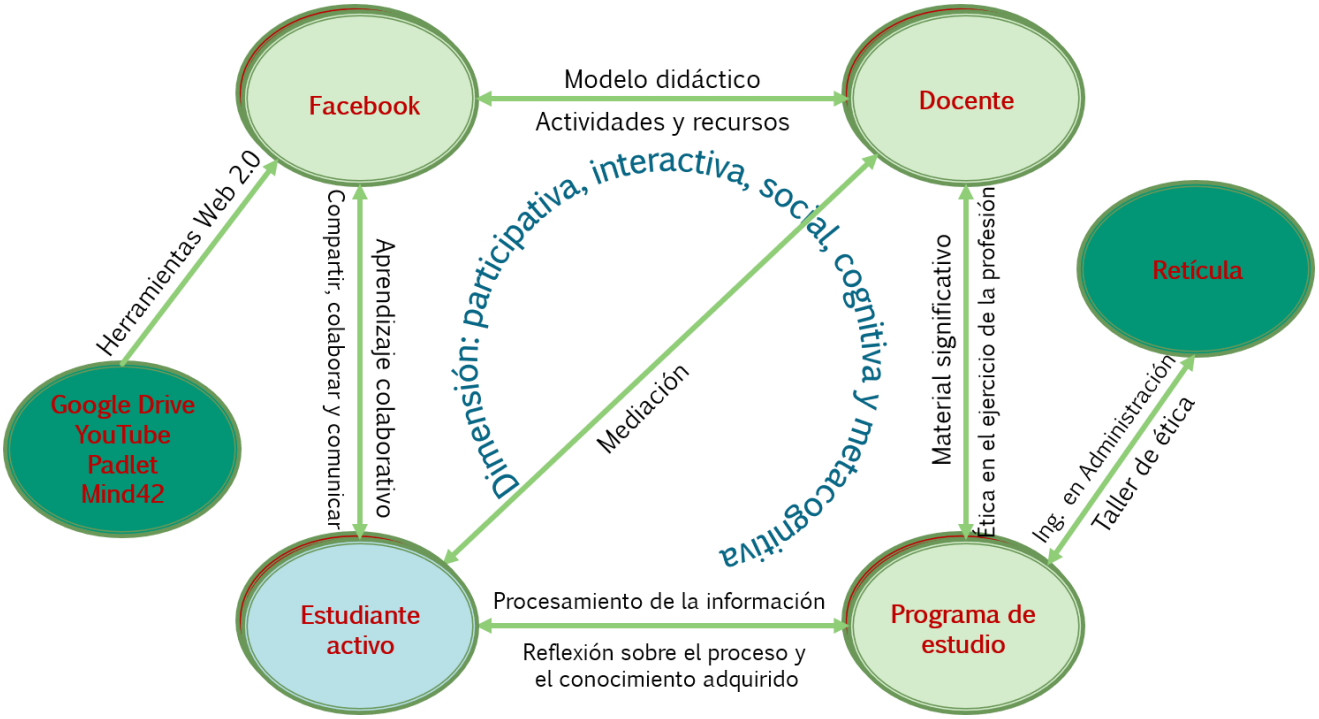
Table 2. Analysis categories data collection instruments

Cases	Segment	ID Questions	Purpose	Analysis
Case A Case B Case C Student D	I use facebook Collaborative learning	N1	Know the perception of students when using a platform that they had not tried for their learning process, from different approaches	Textual
		N2		
		N3		
		N4	To know if students consider AC on Facebook to be conducive.	

Source: self made

A didactic model was established that considered the planning of resources and activities planned for the course (figure 1), which shows that the mediating teacher plans and shapes the activities during the course, according to the study plan and the curriculum. In turn, the student shares, collaborates and communicates through the different activities that will be proposed on the Facebook wall with the group chat plugin and other Web 2.0 tools, such as Google Drive, Padlet and Mind42.

Figure 1. Implemented teaching model



Source: self made

Through mediation, the student was sought to process the information presented in the materials used, so that he could reflect on the process and the knowledge acquired. It was necessary to verify the presence of collaborative learning among the participants, which was determined by searching for the following dimensions: participatory, social, interactive, cognitive and metacognitive. For this, the Henri (1992) model was taken as a basis, which has been used in the analysis of computer-based collaborative learning (table 3).

Table 3. Henri's analytical framework and model

Dimensions	Definition	Signs of presence and/or indicators
Participatory	Compilation of messages or transmissions between people or groups	Number of messages Number of affirmations
Social	Statements or part of them that are not related to the topic	Self-presentation, verbal support, "I feel good"
Interactive	Related message chain	"In response to", "as we said above"
Cognitive	Affirmations displaying the knowledge and tools related to the learning process	Ask questions, make inferences, formulate hypotheses
Metacognitive	Affirmations related to knowledge in general and skills such as showing awareness, self-control, self-regulation of learning.	"I understand", "I wonder".

Source: Henri (1992)

The information was analyzed from the perspective of participation, that is, comments and interactions in the Facebook group and in the student interview. With this, the corresponding data triangulation was carried out.

Didactic intervention

The didactic model was implemented throughout the course with emphasis on the analysis of the topic of *professional ethical dilemmas* (table 4).

Table 4. Content of topic 4: Ethics in the exercise of the profession of the subject

Theme 4	Themes and subthemes	Activities
Ethics in the exercise of the profession	General considerations of professional ethics	Activity 1
	Dimensions and implications of professional ethics	Activity 2 Activity 3
	The professional and his ethics in the exercise of leadership	Activity 4
	Professional ethical dilemmas	Activity 5
	Professional codes of ethics	Activity 6
	Content and implications of professional codes of ethics	
	Meaning of professional codes of ethics	

Source: self made

Activity 5. Ethical dilemmas

The activity consisted of—through Padlet, a Web 2.0 tool—students gathered as a team to choose an ethical dilemma and answer questions related to ethical action. The use given to Padlet in the Ethics Workshop subject was to encourage collaboration between students. Due to its social and collaborative nature, it allows consultation of the creations of others and allows several users to work simultaneously at the same time. This activity was developed for students to analyze ethical dilemmas and identify who intervened in the case, establish what solution strategies they would apply to the dilemma according to the offense committed, and make a judgment about what sanctions they would apply in each case.

To carry out the activities, the students took advantage of one of the platform's features that allowed them to work synchronously and asynchronously at the same time, as well as make relevant queries. Once the resolution of the ethical dilemmas was completed, access to the work of other colleagues was facilitated to learn about other perspectives and generate opinions on the matter. Another advantage is that it was possible to consult the information not only at the school, but also in other places where they had Internet access. Finally, they participated by commenting among themselves on the Facebook wall.

Results

Analysis of the dimensions of Henri's model

Participatory dimension

This dimension is relevant, since it takes into account participations in general. This has to do with the access data, as well as the day and time in which the students began their participation in Facebook and the number of registered participations (table 5).

Table 5. Findings in the participatory dimension

Dimension	Findings
Participatory	The level of participation was high with 58 comments from 20 participants. 20 primary participations, they made a main contribution, then another secondary one to other students. Due to an administrative situation, some absences were recorded. However, thanks to the flexibility of the platform, their contributions were completed later.

Source: self made

Twenty main contributions were recorded: the last three were made in a range of approximately 4:00 p.m. to 8:00 p.m. It was detected that a student made contributions even on another day.

Case A recorded a contribution in Padlet, a main contribution in the Facebook group and two more to other students. Case C benefited from the flexibility provided by virtual learning platforms because he did not attend that day. In addition, he made three secondary contributions in the Facebook group, however, he did not register participation in Padlet. Due to the lateness of his participation, he had no interaction from his classmates.

This activity represented one of the last of the course, although errors were detected. The number of participations was considerable: three comments for case A, three for case B and none for case C. According to Otero and Ferreira (2019), the Facebook tool promotes learning due to the participations generated by the interactions between the students.

Social dimension

The characterization of collaborative learning in virtual spaces is communication, which implies socializing. Therefore, it is one of the analysis categories of great importance, since it favors the democratization of information (table 6).

Table 6. Findings in the social dimension

Dimension	Findings
Social	Case A: It included emoticons to indicate their participation, a sign of social interaction, it had commentators who showed signs of support: "Your case is very interesting" and "I agree with you." Case B *:* "What you commit is very true. Student D ... ". Case C: No comments of a social nature were identified because the activity was not carried out in a timely manner.

Source: self made

The social dimension—understood as the relationship of students with each other and with the community in which they live to attend, understand, resolve and share information regarding the different topics related to their academic training (Araujo, 2019)—was presented with comments like this: "Why can I use social networks as a means to stay in touch with my classmates and carry out projects, tasks and academic activities."

The exchange of information is important in virtual media; Without this, it could be perceived that there is no communication between the members of the group. In this regard, they did not show distraction by giving preference to answers on the established topic; However, they showed vestiges of sympathy among themselves through emoticons (smiling face, blushing face, Pac-man , glasses, thumbs up, strong arm and sleeping face), as well as some phrases: "I agree with your case", "it is very true" , "This is very important". It is inevitable that students will at some point show supportive, empathetic, or joking comments. In this case, they were never negative in nature.

Interactive dimension

The relevance of interaction lies in the fact that thanks to it, knowledge is built collaboratively. This was synchronous and asynchronous, so that they formed a sequence of statements that are related to the responses between students (Henri, 1992) in the following way: direct response (statement that answers a question using direct reference), indirect response (any

statement answering obviously to a question, but without referring to it by name), explicit interaction (any statement explicitly referring to another message or group), independent statements (any statement related to the topic in question, but without being a question or comment and does not carry any other statement) (table 7):

Table 7. Findings in the interactive dimension

Dimension	Finding
Interactive	Case A: Carried out explicit interaction with teacher I without mentioning his name; towards student D indirect comment, since it only concludes his participation. Case B: Obtained explicit participation with teacher I and implicit participation, since it is not mentioned who it is aimed at, but it can be observed. He received three explicit messages. Case C: Related to this case, 3 interactions were detected: independent statements, related to the topic, but they did not generate a thread to continue with other contributions.

Source: self made

The interactive dimension was confirmed with the continuity in the discussion, references were made in messages and extra questions were stated. In this dimension the cohesion within the group could be evidenced. Teacher I's participation occurred directly by establishing the publication in the Facebook group, where instructions were detailed. The classification of interactions in general was explicit.

Cognitive dimension

The importance of the activity on professional ethical dilemmas was that through it the students first analyzed, as a team, a case selected from a bibliographic source by teacher I. The cases are considered supportive for collaborative work; Subsequently, individually, they commented on other cases in conclusion with prior consultation of the contributions in Padlet, which led to collaboration and generation of knowledge. This, without a doubt, requires several of the competencies related to the subject when carrying out both individual and group reflection, promoting decision-making and promoting awareness for ethical action in solving problems (table 8).

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Table 8. Findings in the cognitive dimension

Dimension	Finding
Cognitive	Case A: He showed a position when analyzing the case with his team: “It is clear that the lawyer is only looking for an easy way to distance himself from this issue by not discussing the results with the tenants or the owner, which is why his acting is unethical by hiding information and the engineer by accessing it”, from what has been observed, ethical acting is differentiated.
	Case B: "As possible solutions is to hold meetings so that all employees know the privacy policy that talks about the review of emails and that everyone is informed and also send an email to employees informing them of the policy and the sanctions they may receive in “In case you find any problem.” They showed determination in the actions taken, as well as identification of those involved
	Case C: He viewed his conclusions from his own experience, as can be seen in this fragment of his contribution in the case of involuntary resignation: “I am not saying that all companies are like this, but in a case like this we as workers can go to the different institutions that can provide us with that support and thus can give us what is fair and what we deserve for the time given to the company, which in this case would be PROFEDET." He showed the ability to infer a solution and propose the way forward to solve it. With this, ethical action in a situation of this style was raised.

Source: self made

In general, the students were able to develop the activities and make pertinent comments related to the topics in terms of concluding, refuting, and asking. Contributions were not only made by cases A, B and C, but also by several of the students to differentiate ethical from unethical actions, as well as what is fair or unfair and what should be done. This led to the fulfillment of the objective of the activity, that is, the use of Facebook as a cognitive tool has shown positive experiences in pedagogical practice (Alves and Silva, 2019).

Metacognitive dimension

Metacognition is generally not visible to the naked eye, so it is necessary to take specific actions to promote or follow it. The observation of the group and its participation in the social network Facebook was a good opportunity to verify that this dimension was fulfilled, as observed in the different responses of the cases. In this research, the metacognitive dimension was based on the presence of hypotheses and inferences (Flores-Ruiz *et al*., 2017), self-regulation capacity, declaration of new knowledge, paraphrasing, etc. Some of the mentioned indicators were found in the responses (table 9).

Table 9. Findings in the metacognitive dimension

Dimension	Finding
Metacognitive	Case A: With their team they showed the capacity for self-regulation, they added members to their team, they interacted collaboratively with them, they invited reflection with their answers, they finished the activity in a timely manner. With their answers they reflected the ability to connect previous knowledge with that acquired during that time and the correct application in daily life regarding the ethical actions of the professional.
	Case B: With their team they planned and executed the activity within stipulated times, included synthetic responses, and interacted individually and with other students.
	Case C: It was completed, but not on the indicated day. He showed interest in completing it correctly and also the capacity for self-learning.

Source: self made

In general, the participants showed the capacity for self-regulation, mastery of the topics, use of the tools, pleasure in the activities, as well as inferences. The results of the described activities show that student communication and interaction plays a primary role when working collaboratively. The analysis of the students' work in the Messenger and Facebook group revealed the presence of Henri's dimensions, which is a clear sign of the existence of collaborative learning among the members of this group.

Student experience around working with Facebook

Regarding the opinion of the cases about Facebook as an educational platform to promote collaborative learning, the comments of the interviewed cases are seen in table 10.

Table 10. Perception of cases before Facebook as an educational platform

Student comments regarding the use of Facebook as an educational platform	
N1 Why do you think the Facebook group is useful for learning knowledge from the Ethics Workshop?	Case A: " You can use different tools that this social network offers us, such as publications, comment options, chatting or even sharing things related to the subject."
	Case B: "Through a group you can have feedback on the topic thanks to the contributions you highlight and through the contributions of your colleagues."
	Case C: "In them, not only one person but several contribute ideas and we can take some of them."
N2 Why do you think that the use of group Messenger has helped you better understand the topics of the Ethics Workshop subject?	Case A: "For what was mentioned above, seeing what others think allows us to provide feedback on topics or reinforce our knowledge with which we can establish a dialogue."
	Case B: "Each classmate does what they understood about the topic and contributes important points about the topic, through this you can learn more about the topic and review."
	Case C: "The contributions of colleagues since we rescued important points from them."
N3 Has the Facebook platform been useful to you for the Ethics Workshop subject? Because?	Case A: "Yes, because as I said before, for many it is more comfortable to do work in a practical and visual way, that is, read, understand and then solve in order to give our point of view, in addition to access for the majority It is more favorable and they do not get bored as much, I managed to realize that this social network can be used for educational purposes."
	Case B: "Yes, because we carry out the activities on this social network, and since all colleagues have this social network, we can communicate."
	Case C: "Yes, because from Facebook I am aware of everything that is being done or has been done."
N4 In what ways can collaborative learning	Case A: "When groups are held, they can publish the topics that they had to discuss, in fact, we did it in almost all of them where the groups met, we collected information and from there it was shared through comments, which were fed back to other teams."
	Case B: "Using tools like Mind42, Google Drive, Padlet , Movenote ."

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occur with the use of Facebook groups?	Case C: "Having academic activities in a group chat, where all participants can give their opinion."

Source: self made

The students showed different opinions about collaborative work, although they agreed that they shared ideas and learned through collaboration: "You help other people with a job or something else, being able to understand them," "For me it is like a group." or as teams, we all contribute information and opinions about the activities or topics so that we can all understand them better."

About, Cotan *et al.* (2021) point out that this type of didactic and training strategy encourages students to develop communication skills, symmetrical and reciprocal relationships, and generate spaces for interaction and learning. In this case, they made use of their reading comprehension and discussion among themselves about the topic to later solve the questions.

Regarding collaborative work through Facebook Messenger, the students commented that it not only promotes collaborative work in the academic field, but also in the workplace, because it stimulates everyone's contribution. It was also considered that the work was monitored through Facebook Messenger and promoted good organization. Another response that reflected the opinion of the students was this: "Learning can occur at the moment in which we all begin to give our opinions and points of view and in this way, others reflect on the topic and it occurs. a debate in which we can all learn thanks to the comments of others and the feedback of the teacher." In his study, Corona (2020) points out the following:

> The research on PBL, collaborative work, and the use of Facebook and other web 2.0 resources, positively impacted the teaching-learning process of electrocardiography in their professional training of students, who were motivated more than with traditional teaching to express your doubts and interact with the teacher; they developed skills for negotiation and communication; they cultivated solidarity, responsibility and respect for the ideas of others; They acquired experience in scientific-research activity and skills in the use of various Web 2.0 resources, all of which contributed to preparing them for continuous learning, professional activity and to act as future researchers (p. 10).

Cabero-Almenara *et al.* (2019) explain that the attitudes of higher-level students to work in groups are highly significant. In this study, most of the participants considered that collaborative work can be encouraged through Facebook groups "in an easy way, since by leaving the activities and sharing them with our colleagues they could access and see the information." and also give

their opinion and contribute what collaborative learning achieved." Another comment referred to the benefits of using the group to achieve collaborative learning by sharing information and doubts, to resolve them in the moment and everyone can contribute to the topic."

On the other hand, it is interesting to comment on the responses of the case studies. For example, case A mentioned: "Where the groups met, information was collected and from there it was shared through comments, which were fed back to other teams." Case B referred to the fact of being able to give opinions through the Facebook group chat, while case C considered the applications that were used in each of the activities as a means for collaborative learning to be consolidated.

In short, the social network Facebook helped students recognize both their personal and group strengths. In addition, they identified some opportunities for improvement, such as "patience", "work faster", "coordination", "listen to people", "fit in without problems, although I like to work alone", "feedback from everyone, although sometimes principle is confusing", "lack of interest, but when I do it, I do it well", "a little irresponsible, I contribute ideas", "not everyone works, take the initiative", "I am participatory and accept feedback, I am insecure when taking decisions." From these opinions "it is inferred that there is interest on the part of young people to participate, build, and contribute collaboratively" (Abúndez, 2015, para. 22).

Finally, they recognized that the tools they used throughout the semester helped them do the work collaboratively. From the perspective of student D, "When groups are held, they can publish the topics that they had to deal with, in fact, we did it in almost all where the groups met, information was collected and from there it was shared through comments which were fed back to other teams".

Discussion

The analysis carried out, based on a methodological design for a case study, allowed us to identify the presence of collaborative learning on the Facebook platform (Simmons, 2011), as it facilitated interaction between students and provided the opportunity to analyze learning. computer-mediated collaborative. In this regard, Coll (cited by Olmedo and Farrerons, 2017) maintains that "the incorporation of knowledge will occur if specific help is provided through the student's participation in intentional, planned and systematic activities that manage to promote a constructivist mental activity" (p. 11).

On the other hand, Henri's model is recognized as a methodology for "discourse analysis on the Internet" (Moreno *et al*., 2023, p. 1739), and through it the categorization of the analyzed dimensions was proposed.

In relation to the dimensions, the first of them (participatory) refers to the messages and statements related to the activities assigned on the Facebook wall by students and teachers, for which the moment of participation was also considered. During the study, the presence of this dimension was observed, since the students made the necessary entries to meet the goals established during classes, either synchronously or asynchronously. In this sense, it is worth highlighting that participation is crucial, since without it collaboration cannot occur. In this context, Melo- Latelier *et al*. (2023) point out that, during the pandemic, students were linked virtually thanks to virtual means of participation, such as chat or writing spaces, which also facilitated feedback and social interaction.

Regarding what was found during the research, the interactive dimension was manifested from the beginning of the communication when writing in the Facebook environment. Subsequently, a second moment occurred with a response and, finally, another response to the first communication was presented. In the context of the research, the students reacted to each other and to the communications established by the teacher, all within the framework of the topic addressed.

Garzón-Bermúdez and Cortés-Escobar (2022) demonstrated that, in an informal course intended to support mathematics teaching, students interacted with a definitive purpose. In this sense, various forms of interaction were observed, including the direction of contributions between students, whether directed at specific recipients, by length and size of the message and by the publication format, which was not limited to the textual, but which also included images. All of this allowed the authors to identify the mathematical difficulty present in the comments, which was used to stimulate the most meaningful interactions.

In addition, an affective component was observed expressed through greeting messages, communications through chat and the wall, as well as the use of *likes*, all of which encouraged participation. The presence of this affective dimension, mentioned by Henri (1992) as the social dimension, encompasses any statement or participation that is not directly related to the formal content of the topic discussed. This leads to observing concentration on the task and social cohesion, which can positively or negatively influence the learning process.

During the observation of this dimension, moments stood out in which students focused on collaborative work and expressed signs of empathy through emoticons allowed by Facebook and

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sharing some verbal jokes. Furthermore, during interactions between them, they expressed their agreement through phrases such as “it is very true” or others.

The critical thinking exhibited by the students during the completion of the activities, given the nature of the subject, was evident throughout their textual representations on the social network used. For example, students were able to link their ideas, state facts, infer, interpret, judge or propose solutions related to the activities presented. They also contributed with supporting examples, considering the students' level of information management. All this represents the cognitive dimension as a fundamental piece to promote collaborative work.

In relation to the study carried out by Barbosa-Chacón *et al*. (2019) on collaborative learning practices with the incorporation of ICT, it is highlighted that analogical reasoning and reflective analysis are facilitated through peer interaction, which enables cognition and, therefore, the acquisition of knowledge. The technologies used supported the construction of environments that favored argumentation and understanding of reality.

This approach is intrinsically linked to the metacognitive dimension, which seeks to identify the presence of self-regulation in students. This refers to their ability to manage their tasks, evaluate the results of their efforts, establish strategies to achieve goals, plan by organizing means, perform self-assessments to verify the results of their actions, and use awareness to recognize themselves as learners.

The clear presence of this dimension was evident in the mobilization of prior knowledge by the students during the activities, as they were able to formulate hypotheses, infer, self-regulate and acquire new knowledge through the use of paraphrasing. In addition, they associated ideas and demonstrated the ability to apply what they learned in everyday life situations. These manifestations were identified during their participation in activities related to real life situations.

According to various studies (Flavell, 1987; Kipnis and Hofstein, 2008; Pintrich, 2000, cited by Martins de Almeida *et al*., 2020), metacognitive knowledge is intertwined with experiences that contribute to the integration of knowledge. Furthermore, autonomy and self-regulation play a crucial role in this process, where students actively participate by setting goals and evaluating both their cognition and behavior. The mentioned concepts reveal that the authors focused their research on the implementation of the flipped classroom and the use of ICT to analyze the perceptions of students and teachers. Through metacognition strategies, it was shown that the combination of these factors favored progress in learning the topics raised.

Regarding the use of Facebook as a collaborative learning tool with positive results, Mosquera and Higuera (2022) carried out a qualitative and transversal research approach with

architecture students. Through observation and interviews, they concluded that the students showed interactivity, receptivity, participation and socialization, elements considered of great importance to strengthen collaborative learning.

Following the line of thought expressed by Corona (2020), online learning and the use of Facebook were highly accepted by students, who stated that the inclusion of these tools in the teaching-learning process increases interest, makes it more attractive and has a positive influence on achieving the objectives of the topic under consideration. This support agrees with the opinions of the students, who not only supported its use as a complement to the teaching strategy and collaborative learning, but also simultaneously with other tools.

In short, the Internet is consolidated as a highly relevant tool in universities, and students constantly use it for educational purposes (Cabero-Almenara *et al*., 2019). In fact, studies related to the use of social networks by adolescents in Mexico reaffirm the global predominance of Facebook over other platforms (Gómez-Hurtado *et al*., 2018).

Conclusions

Carrying out this study at the Technological Institute of Higher Studies of Los Cabos (ITES Los Cabos), Cabo San Lucas extension, involved solving several challenges, among them, Internet accessibility within the classroom and the adequacy of the space where they are normally carried. out the classes. The implementation of collaborative learning through a Facebook group as a virtual platform, together with Web 2.0 tools, in the teaching-learning process of the Ethics Workshop subject was manifested through the activities carried out, which were analyzed using Henri's model.

The qualitative methodology was used to describe everyday reality in terms of daily learning and students' responses, which made it possible to identify the presence of the dimensions of collaborative work. In general, students demonstrated self-regulation skills, mastery of the topics and tools, enjoyment of the activities carried out, and the ability to make inferences.

The use of Web 2.0 tools during the research transformed the students' perception of them. Their lack of knowledge about the educational application of Facebook was confirmed, and they were even unaware of the existence of certain tools such as Padlet or Mind42, tools that played a crucial role as organizers of the required activities and allowed students with different personalities and learning styles to collaborate with each other. This led to the overcoming of incompatibilities by offering flexibility, adaptation to new rhythms and the discovery of students as autonomous knowledge managers.

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Therefore, the implementation of the Facebook group and Web 2.0 tools as a virtual platform to mediate the teaching-learning process in the Ethics Workshop subject, with the purpose of demonstrating the development of collaborative learning, was confirmed in this research.

Given that ICT and the teaching-learning process are constantly evolving, it is imperative to follow up on innovative activities that make a difference in the classroom with the inclusion of these tools. Even though students are considered to be digital natives, their use of Facebook was observed to be limited to superficial functions such as staying connected, communicating and exchanging information. In addition, it was found that they were unaware of the rest of the Web 2.0 tools, such as Padlet and Mind42. Even so, the experience in this class allowed them to understand that these tools could go beyond their basic functions and, in this case, facilitate collaborative learning of the subject, mainly through Facebook, and incorporating other technologies. The inclusion of ICT as a contribution to the didactic intention is presented as an opportunity for study considering the contexts of the educational community at all levels with the aim of implementing its best uses and applications.

On the other hand, the results revealed that students' communication and interaction play a fundamental role when working collaboratively. Furthermore, no negative attitudes were observed in the messages analyzed. The analysis of the students' work in the Messenger group and the Facebook group demonstrated the presence of Henri's dimensions, which was confirmed by the existence of collaborative learning between the members of this group.

Now, due to the extension of this work, it should be noted that only the result obtained from one activity is presented. Consequently, an opportunity for improvement in this research would be to carry out the analysis of the interactions taking into account more than one group to contrast both results from a quantitative and qualitative perspective.

Regarding the accessibility of Facebook as a platform to support courses, health authorities worldwide and, in particular, those of Mexico, point out that the greatest effects caused by the covid- 19 pandemic have driven the application of ICT, including already known tools such as social networks, as a viable option due to their easy access, use and free of charge.

Future lines of research

The present research has focused on the analysis of the textual participations and comments generated during the students' intervention, as well as their perception. As a continuation and to enrich the understanding of collaborative dynamics in virtual environments, a line of research is suggested that focuses on the analysis of networks built from comment threads. This approach

would allow us to identify and understand the types of relationships established between community members, as well as explore the use of language in relation to the knowledge acquired. In addition, new forms of virtual communication and student behaviors could be investigated after the covid-19 pandemic, in particular, in the face of the continued use of virtual platforms. Another recommended line of research could be the exploration of methodological proposals for the management of personal learning environments in the academic community and its connection with the established objectives.

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