WhatsApp as a resource for group work in university students

WhatsApp como recurso para el trabajo grupal en estudiantes universitarios

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ABSTRACT

The objective of the research was to analyze the group work carried out by students at a public university in the State of Hidalgo through the use of WhatsApp. A descriptive study with a quantitative approach was carried out, and a survey was applied to 299 students of the bachelor's degrees in Education Sciences and Social Work. Among the main findings, the usefulness of the technological tool for the organization of work stands out, and the development of efficient communication between students and students, as well as students and teachers, which strengthens interpersonal relationships, among the limitations are the distractions that came up by sending information that does not correspond to the subject of study.

RESUMEN

El objetivo de esta investigación fue analizar el trabajo grupal que realizan estudiantes de una universidad pública en el estado de Hidalgo mediante el uso de WhatsApp. El estudio es descriptivo con enfoque cuantitativo, y se aplicó una encuesta a 299 estudiantes de las licenciaturas Ciencias de la Educación y Trabajo Social. Entre los principales hallazgos, destaca la utilidad de la herramienta tecnológica para la organización de trabajo, el desarrollo de una comunicación eficiente entre estudiantes, y entre estudiantes y docentes, lo que fortalece las relaciones interpersonales, siempre y cuando se trabaje con grupos pequeños y se implementen actividades didácticas concretas. Una de sus limitaciones son las distracciones que surgen con el envío de información que no corresponde al tema de estudio.

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INTRODUCTION

The rise of information and communication technologies (ICTs) in the different areas of daily life has configured new social and organizational forms, by changing paradigms and challenging traditional boundaries, as well as temporary spatial boundaries, since, thanks to them, digital communication has increased (Agnese, 2017) as well as the frequency to make contact with people from different parts of the world. This has been the case from a variety of expressions such as text, images, videos and audios (Coll & Monereo, 2018). Therefore, digital communication is a common activity of an individual's daily life, and the evolution of the technological environment is the cornerstone to understand the patterns on the use of Internet (Rodriguez-Martinez *et al.*, 2016).

Social networks are one of the most resorted technological resources by users. Fuchs (2017) defines them as computer systems and web applications that enable access to information, and establish direct communication among people by means of text, images, audios, and emoticons, which acquires significance and meaning in the communicative process (Serra *et al.*, 2017).

Bernal (2017) asserts that mobile devices have had a significant evolution in the last ten years, as they are not only used to call users but also to establish asynchronous conversations, so, with this purpose, WhatsApp is the mostly used resource currently (Gomez-Camacho & Gomez, 2017).

Morales (2014) describes the smart phone as "a mobile telephone with the capacity to connect to Internet with most multitask functions performed by a computer, although with some additions: GPS, accelerometers, multimedia players, picture camera" (p. 93).

WhatsApp is an instant messaging application for mobile devices which promotes communication exchange and allocation of multimedia messages in a fast and plain manner (Yeboah & Ewur, 2014), it enables sending and receiving information in different formats, such as text, images, web links, videos, audios, and holding videoconferences, furthermore, there is no character limitation (Cremades, Maqueda & Onieva, 2016) and enables total control by the user (Lopez & Castro, 2019). This application has increased immediacy, as message response time has been reduced and the use thereof is on the increase (Rodriguez, Martin & Blanco, 2018); it seems there is a permanent connection (Morduchowicz, 2013),

which can cause addiction to be connected, above all on teenagers and college youths.

Using WhatsApp has become one of the daily activities to most of people. This term is the result of a wordplay and the adaptation of *What's up?*; in addition, there have been several adaptations in the Spanish language in accordance with grammar criteria of the Spanish language, among which are the noun *wasap* and the verb *wasapear* (Suarez, 2018; Fundeu, 2014).

There are great communicative, technological and economic advantages of the WhatsApp application. From Calero's perspective (2014), there is no doubt that different digital languages facilitate and diversify the manner in which people communicate. Gordo *et al.* (2018) underscore the fact that this application has been established as the main communication tool with greater influence in micro-networks.

The purpose of the National Survey on the Availability and Use of Information and Communication Technologies at Home (ENDTIH, 2018, by its acronym in Spanish) is to gather information on the use of ICTs of six-year-old people and older in Mexico. Use of mobile telephony is emphasized in this survey, with reports on indicators in accordance to sex, age groups, education levels, economic activity condition, frequency of use, equipment type, and payment system. Amount reported results in the survey of the National Institute of Statistics and Geography (INEGI, 2019, by its acronym in Spanish). The report states that 51.6% of women and 48.8% of men use mobile telephony; regarding age groups, the 25-34-year block use it the most, with 19.2% and the 55-year-old or older block use it the least, with 9.8%.

Increase of mobile device coverage has generated greater presence in academic fields (Organista *et al.*, 2016), which represents a challenge to incorporate technologies in a didactic manner in the learning process, and which contributes to the construction of knowledge both in an individual and collaborative form (Tapia-Repetto, Gutierrez & Tremillo-Maldonado, 2019). The Organization for Economic Cooperation and Development (OECD, 2015) sustains that countries have invested in the use of ICTs, unfortunately, there has not been any substantial improvement in the teaching-learning processes, above all regarding reading and writing, as well as on the development of logical-mathematical thinking.

Currently, it is important to recover educational theory and focus on "person-centered learning" (PCL) by incorporating ICTs, whose main exponent is Carl Rogers (1982). This approach establishes that learning is a self-teaching activity and, therefore, the teacher or the tutor mediates and facilitates the learning activity in accordance with the personal features of the learner, who learns through self-discovery and is capable of doing this in a self and non-directive manner.

In the eighties of the twentieth century, the PCL proposal was not really feasible with classroom learning environments and large groups of learners, but, nowadays, teachers may find support on ICTs, and even on social networks to organize small working groups and to assist them individually; it is also possible to take a step beyond if necessary, when performing a personal follow-up of learners with special characteristics. A teacher, or in this case the learning tutor may make use of technological tools to manage group support for learners in need with the purpose of receiving guidance from their peers and a social support network to plan and execute didactic activities and, therefore, to achieve educational objectives and the development of the competences set forth in the learning plans. A tool which meets these purposes and which, in part, returns validity to PCL is the WhatsApp application.

In the educational field, using the WhatsApp application has risen interest among researchers, therefore, the purpose of study around this topic is on the increase –mainly with learners in higher or college education– on research performed in the United States and Latin America, in countries such as Spain, Colombia, Ecuador, Argentina, Venezuela, Uruguay and Brazil.

Among the advantages of using the WhatsApp application, Padrón (2013) mentioned that having more time to think what to say in the message, to chat with mobile contacts, to promote didactic strategies and to make groups. Ramírez (2019) and Hernández (2016) emphasize on the development of digital competency and on communicative facility, whereas Suarez (2018) point out communication fluency and flexibility. On the other hand, Fondevila-Gascón *et al.* (2019) and Fondevila, Mir & López (2018) comment on the convenience and benefit provided by this tool.

Barhoumi (2015), Vilcehs, Reche & Marín (2015), López & Castro (2019) and Trejos (2018) sustain that the use thereof enables doubts to be clarified, sharing information, and more frequent interaction between teachers and peers. To Tapia-Repetto *et al.* (2019), this

fosters finding solutions to difficulties encountered during the learning process. Gómez, Roses & Farías (2012) emphasize on the relevance of being informed on the pace of the class and on preparing works as a group.

Hidayanto & Setvady (2014), Villadiego (2014) and Serra *et al.* (2017) say that the WhatsApp application helps in reorganizing the group class (Bouhnik & Deshen, 2014) and it also fosters different modes of interaction and social participation (Comas-Quinn, De los Arcos & Mardomingo, 2012). In addition, it favors collaborative work (Paredes & Zambrano, 2000), there is a more active participation of introvert learners, it has a positive influence on the performance of learners, it sets roles among the members of a group (Gómez & Shafirova, 2016), and it is a great help to make decisions (Pessoa, Taboada & Shafirova, 2016); Giasanti, Taboada & Motta, 2016).

When addressing the topic on the use of the WhatsApp application, it is important to state some disadvantages or limitations. To Rosenbaum & Wong (2012) and Gómez (2017), the increase on the use may cause neurosis, impulsiveness and a negative mood on learners; on the other hand, Jacobsen and Forste (2011) emphasize that academic performance is reduced by using the WhatsApp application, while Rubio-Romero & Lamo (2015) affirm that distractors increase in the college classroom.

Regarding communication processes, Gómez (2017), Gómez & Shafirova (2016), Cremades *et al.* (2016), Gómez-Gamacho & Gomez (2017) and Fuentes, García & Aranda (2017) analyze the linguistic use of Spanish college learners and the use of the WhatsApp application and show a finding that technology is no longer textual only, for there also are images, audios and videos, in addition to developing new linguistic competencies, disciplinary knowledge, and ways of relating. Ruvalcaba *et al.* (2019) and Andújar-Vaca & Cruz-Martínez (2017) report on significant improvements of learners of a second language by using this application.

Rubio-Romero & Lamo (2015) say that employing the mobile device favors communication with a diversity of persons. Noscué, Pauloni & González (2019), on their research, address social-communicative practices and cultural consumption of Argentinian youths. Conversely, Galán (2011) emphasizes on the fact that the identity of the interlocutor is real most of the times; however, there have been

new social-communicative behaviors where it seems that the conversation is more with a character than with a person.

In the United States and in Latin American countries, there have been surveys to confirm the relevance and the increase on the use of the WhatsApp application as a mobile application favoring organization of and collaborative work, especially, in higher education. It is worth mentioning that we have found not only a survey made in Mexico on this topic, applied to medium-higher education, hence our interest to analyze the use thereof at this level, for it is becoming more common in the classrooms of bachelor studies where group leaders create WhatsApp groups to keep communication with their peers and, in some cases, teachers also make these groups with their learners as a space to have doubts clarified and to define activities and tasks.

Therefore, the WhatsApp application contributes to facilitate learning as learners are provided with autonomy, and the organization of small groups or teams for the performance of didactic activities is favored.This is carried out in a less directive and more participative and independent manner, as proposed by PCL. In this case, the WhatsApp application contributes to the compliance with the PCL principle specified by Martin (1994), who states that a teacher, as facilitator, creates the environment and methodologies so that learners, on their own, develop their learning from their personal concerns and not imposed in a ruling or external manner.

According to Caraballo (2011), through PCL, "the learning process is internally made by means of coaching, guidance or external help from the facilitator, tutor, advisor, which allows the participant to be the self-manager of his/her learning" (p. 97). In this case, the WhatsApp application assists learners of higher or college education to manage the learning activity on their own: organization of group work, communication systems and interpersonal relations.

This technological communicative tool allows learners to be organized with autonomy with the teacher to make work teams, to optimize communication with the purpose of meeting educational goals and, at the same time, to strengthen interpersonal relations. Thus, the teacher is more a tutor and learners are more autonomous to solve problems and academic challenges, such as group dynamics, for example, allocation of tasks, remedial arrangements for lagging learners, exchanging ideas and clarifying questions and concerns; at the same time, the learning process may be structured and planned

and made more manageable by means of sub-topics, with the collaboration of the facilitator or the tutor.

Also, the WhatsApp application contributes to strengthen interpersonal relations as it favors emotional support and distributive leadership among learners, with no need to have full classroom attendance. Definitely, the WhatsApp application aids in meeting PCL in the sense that when "believing and trusting a learner, there is greater permissiveness, greater freedom, because it is believed that the learner can assume his own responsibility" (Martin, 1994, p. 250).

In this sense, Vilches *et al.* (2015) say that, very often, college learners are asked to organize tasks and groups that need interdependence among its members (creativity and autonomy); their relationship requires negotiations and agreements, and exchanging information, that are performed each time by means of ICTs. This application is drawn as an enhancing and facilitating tool of the learning processes; in addition, it develops the capacity to work in the group, essential features of PCL.

The purpose of this survey is to analyze group work performed by learners of a public university in the State of Hidalgo by using the WhatsApp application, aimed to assess the organization of work, the communication processes, interpersonal relations, and the challenges and limitations faced by participants.

METHODOLOGY

Our survey is of the descriptive type with a quantitative focus, which allows us to provide an answer to the stated objective; there were 299 learners participating from the bachelor degrees in Education Sciences and Social Work of a public university in the State of Hidalgo, Mexico.

We used the questionnaire "Uses of WhatsApp in the regulation of group work for degree studies of the University of Cordoba, Spain", designed by Vilches *et al.* (2015) with a validation of internal consistency, discrimination capacity of the elements and an exploratory factorial analysis; there is a Cronbach's alpha of 0.929 (very strong reliability). The questionnaire is structured in four blocks (see table 1).

Table 1. Structure of the questionnaire used

Block (dimensions of the variable)	Range of items	Subtotal	Percentage
1) WhatsApp and group organization	1-15	15	25
2) WhatsApp for communication for group homework	16-30	15	25
3) WhatsApp in interpersonal relationships	31-46	16	27
4) WhatsApp and its limitations	47-59	13	23

The questionnaire is made of 59 items on a Likert type scale with five graded answer choices from 1 (completely in disagreement) to 5 (fully in agreement). In this case, the measuring parameter was intensity. The instrument's interpretation scale is shown in table 2.

Table 2. Interpretation scale

Category	Interval
Optimizes	81-100
Facilitates	61-80
Contributes moderately	41-60
Limits	21-40
Hinders	0-20

The basis of these categories is facilitation, from the theoretical-methodological approach of PCL, and this refers to provisions and mediations so that a learner learns in an autonomous and creative manner, there is guidance but not interference, interpersonal relations and communication are promoted, as well as emotional support among learners; he/she plans in a participatory way to establish learning sub-goals and, therefore, allows the tutor to perform a follow-up and assessment of the learning activity from the parameters set forth by learners on their own, upon whom self-discovery, bonding, and learning transfer become relevant to their personal and professional life (Bastidas, 2017).

WhatsApp "facilitates" PCL's own mediations; when performed in an effective manner, the category would be "optimized"; in an intermediate point, "contributes moderately"; otherwise, "limits"; and a superlative level, "hinders" PCL.

The technique for the analysis used was descriptive statistics with a central measure on the median, through the SPPS program. Tables and charts were prepared by this tool, and they were supplemented by circular charts showing frequency percentages of answers provided by surveyed college learners. It is closed by applying Pearson's simple correlation of the dimensions of the variable.

According to table 3 and chart 1, the median of the use variable (usefulness) of WhatsApp for work of university students in groups was 67.4 in a 1 to 100 scale. According to the interpretation scale, it is located under the "facilitates" category. This means that this application and social network favors group work of learners regarding the organization, communication systems, and interpersonal relations of academic work groups, while there are few limitations.

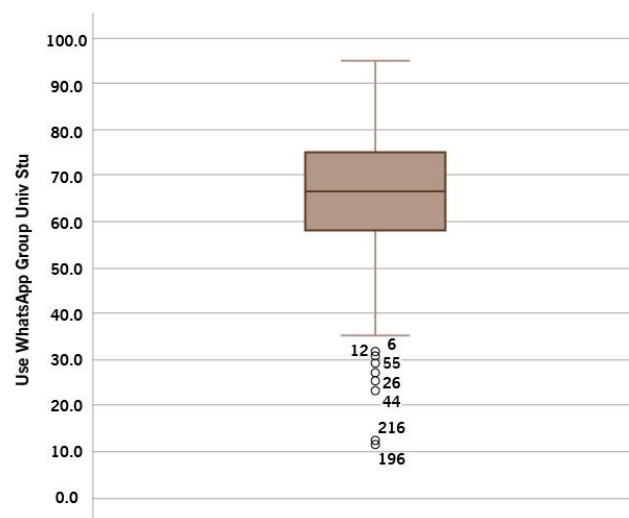| Use of WhatsApp by university students		
N	Valid	299
	Lost	0
Lost		64,400
Minimum		11,4
Minimum		95,3
Percentiles	25	58,800
	50	67,400
	75	75,400

Chart 1. Median box of the variable: use/usefulness of WhatsApp
in groups of university learners.

We have noted that this is a relatively homogeneous group with seven atypical cases below the minimum (11.4). The rest of the sample is located between the percentiles of a minimum of 11.4 and a maximum of 95.3. The most homogeneous percentile ranges from 67.4 to 75.4, and it is barely distributed by eight points above the median. With a little more dispersion, still homogenous, is the second quartile, ranging from 58.5 to 67.4 with a margin of nine points; then the percentile going from 75.4 to 95.3, with a range of 20 points. The most disperse quartile is the first one ranging from 11.4 to 58.5, distributed in 47 points.

Atypical cases were as follows: 6. 12. 65. 26. 44. 216, and 196, with no significant differences if they are compared with the general sample, nor are they homogeneous among them in respect to data: semester in progress, shift, age, sex and use of WhatsApp with professors or friends. The third quartile, the most homogeneous, falls in the range of the "facilitates" category. This means that 25% of surveyed learners find WhatsApp as a favoring application of work groups of university learners (chart 2). The other quartiles are not consistent with the scale in spite of the fact that the second one is the most homogeneous and falls below the median.
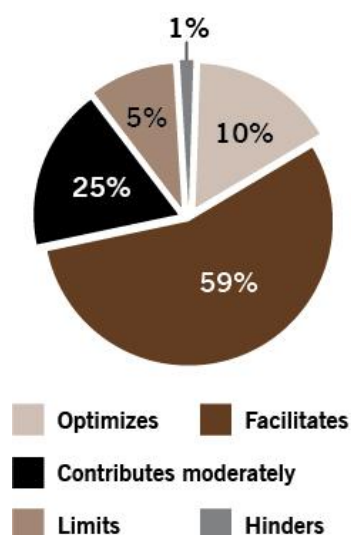

Chart 2. Percentage per categories of use/usefulness of WhatsApp for work groups of university learners.

Furthermore, 59% of surveyed learners see that, in accordance to the use of the application, it facilitates the organization, the communication system and interpersonal relations to make and develop work groups for academic university issues. Likewise, 25% say that this is support to form and maintain groups to do learner tasks in the learning processes; 10% are inclined to express an attitude showing that WhatsApp is a tool used to optimize collaborative learning for didactic activities (chart 2). There is a tendency to show that the use of WhatsApp is useful to create synergy on academic activities among learners, and between learners and teachers.

In chart 4, it must be noted that there is a similar behavior of the first three dimensions. Regarding 1 (use of WhatsApp for organizing work), the median is located in 73.2, in dimension 2 (WhatsApp as support of the communication system for workgroups) the median obtained was 78.1; this same measure was reached by interpersonal relations. These three dimensions correspond to the "facilitates" category, whereas in the limitations category, the median was 34.6 and, therefore, it is consistent with the homonymous category.

Table 4. Median of dimensions of use/usefulness of WhatsApp in groups of university students.

		Organization of group work	Communication systems	Interpersonal relationships	Limitations
N	Valid	299	299	299	299
	Lost	0	0	0	0
Median		73,200	78,100	78,100	34,600
Minimum		1,8	,0	,0	,0
Maximum		100.0	100.0	100.0	100.0

Percentiles	25	58,900	67,200	64,100	21,200
	50	73,200	78,100	78,100	34,600
	75	87,500	85,900	90,600	50,000

In the group work organization dimension there is a dispersion in the first quartiles with eight atypical cases and beyond the minimum limit (see chart 3). There also was a minimum of 1.8 and a maximum of 100, this aspect is consistent with the interpretation scale. The fourth quartile is the most homogeneous, between 87.5 and 100, whose range falls under the "optimizes" category. The third quartile ranges between 73.2 and 87.5, with 14.7 points above the median. The second quartile falls in the range of 58.9 to 73.2 with 14.3 points dispersed below the median. The third and second quartiles are similarly homogeneous. The first quartile is more disperse, between 1.8 and 58.9 and is distributed among categories: hinders, limits and contributes moderately, in accordance with the interpretation scale.
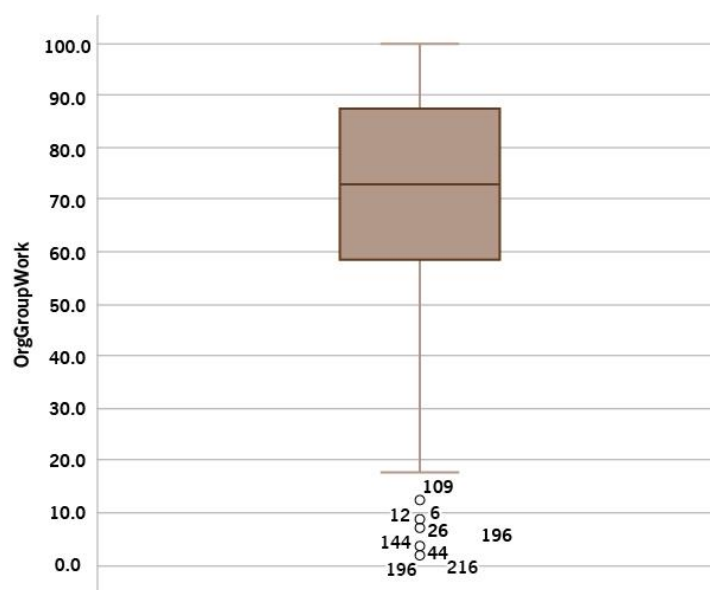

Chart 3. Median box of dimension: organization of group work.

As noted in chart 4, 38% of the surveyed learners marked options showing that WhatsApp is a tool to facilitate or to favor the creation and structuration of workgroups of university learners: 35% agreed on significant circumstances to perceive this social network capable to optimize the making of workgroups of learners. Conversely, 21% stated, per their experience, that this application moderately contributes to their academic bonding and articulation with study peers.
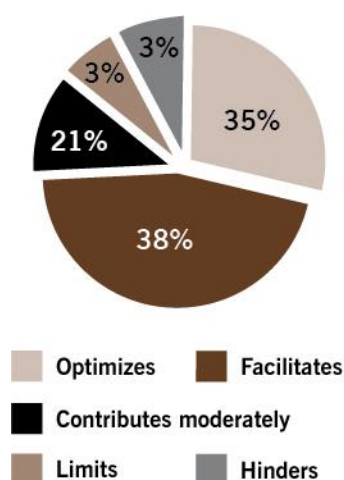

Chart 4. Percentage per categories of use/usefulness of WhatsApp to organize workgroups of university learners.

The most relevant aspects facilitated by WhatsApp in organizing workgroups of university learners are: to plan activities to be performed (item 2), to organize and allocate tasks (3), to discuss and add work aspects (item 4) and, to coordinate delivery terms (item 6). On time planning, allocation and follow-up of tasks are actions facilitated by WhatsApp, in accordance to surveyed learners. The less favoring aspects are: to draw the attention of all the components of the group on tasks that are to be performed (item 9), to meet group members (item 11), and to solve complex tasks (item 7). In accordance with the above, this application is a facilitating support, but it does not substitute workgroup organization and dynamics, above all of complex tasks that require emotional aspects, such as socializing, and drawing attention.

In the communication system dimension, there is a greater dispersion than the former one (see chart 5), with a minimum of 0 and a maximum of 100. The third quartile, which is between 78.1 and 85.9, is the most homogeneous one, and is distributed only 7.8 points above the median; the second quartile follows, barely 10.9 points below the median, between 67.2 and 78.1. The fourth quartile is also homogeneous and ranges between 85.9 and 100, with a dispersion of 14.1 points. The first quartile shows more dispersion than the one of dimension 1, with a range between 0 and 67.2; 25% of the sample is distributed in 67.2 points, which is not consistent with the interpretation scale. There are fourteen atypical cases, five of which are far from the median, below 15 points.
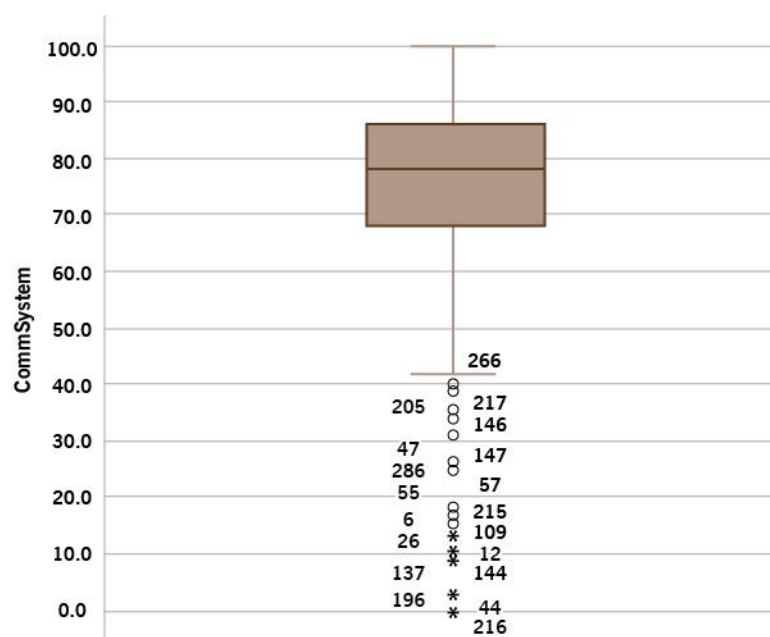

Chart 5. Median box of dimension: communication system.

Moreover, 43% of the surveyed learners marked action answers showing optimal assistance of WhatsApp to structure and maintain communication systems of the academic workgroups; 40% say that it rather facilitates circulation of information and interaction (see chart 6). The remainder of the sample, 17%, is distributed in the other categories, as was made evident in chart 5 of the dimension median.
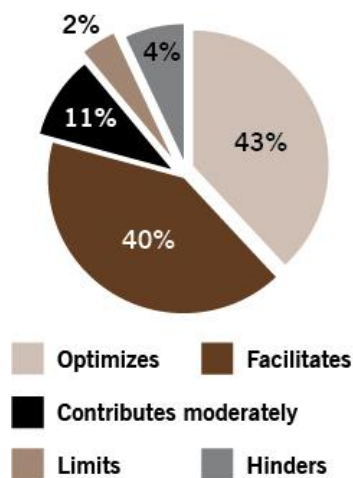
Chart 6. Percentage per categories of use/usefulness of WhatsApp for communication systems of workgroups of university learners.

This is a logic behavior of the sample because the application being surveyed essentially is for communication, and it is shown by the items with greater points in this dimension; it is convenient and easy to use (17), it is useful to communicate instantly and in the distance (19), it is useful to exchange academic information in general or about a specific topic (24). For this reason, it is an aid that favors and optimizes communication to perform academic group tasks. Learners reported the facility of this application to reach agreements in personal meetings, and to make explanations due to absences; in addition, the format does not imply greater errors or communication blocking.

There is a similar behavior of the interpersonal relations dimension to that of the communication system as they are supplementary and synergic aspects (see chart 7). The foregoing notwithstanding, interpersonal relations are less homogeneous with a more extreme dispersion in the first quartile. In this case, quartiles two, three and four are gradually more homogeneous. The fourth quartile is the most homogeneous and goes between 90.6 and 100 points, with an interval of barely 9.4 points; the third quartile is located between 78.1 and 90.6. with only 12.5 points and above the median, the second quartile covers 14 points below the median, as it ranges between 64.1 to 78.1.
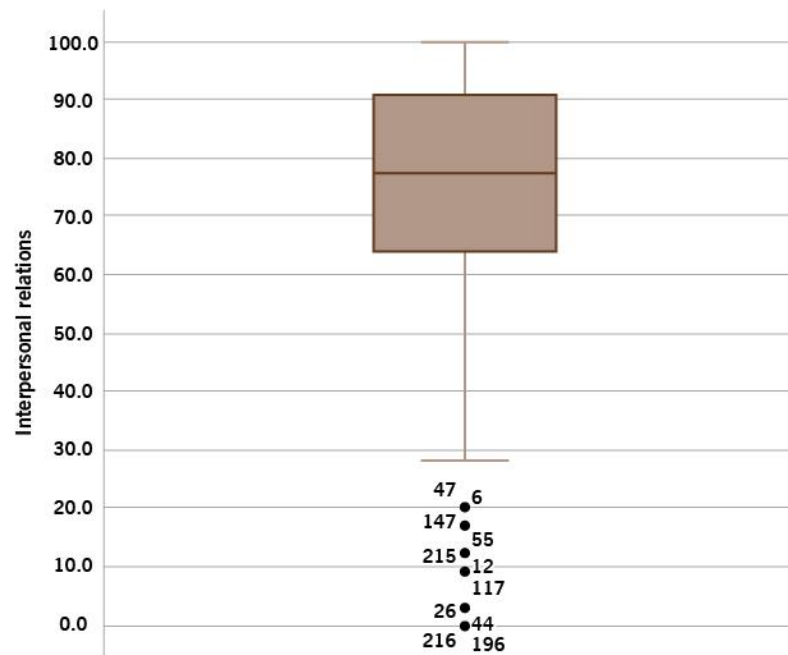
Chart 7. Median box of dimension: interpersonal relations.

The first quartile is dispersed between 0 and 64.1 points. There is no consistency between the behavior in this dimension and the interpretation scale. In spite of this, atypical cases were reduced to eleven in respect of the previous synergy. These atypical cases may show that not all the learners are comfortable or satisfied with the use of WhatsApp in this kind of work.

46% of surveyed learners agree with affirmations that WhatsApp is an optimizing application for interpersonal relations between academic work teams (see chart 8); 35% say that this tool facilitates interaction among study peers; and 12% say that it only contributes moderately. Interpersonal relations strengthened by WhatsApp are, among others, simultaneous interaction with several persons (item 31), permanent contact with group peers (item 32) and reporting important academic events (item 40). It also facilitates and improves things related with a solidarity system and mutual support in the sense of explaining class doubts, catching up with the class after being absent, giving and getting, sharing methodologies, exchanging opinions, and getting guidance from peers. The foregoing notwithstanding, the WhatsApp application does not seem to be as efficient when planning and coordinating large group meetings (item 44).
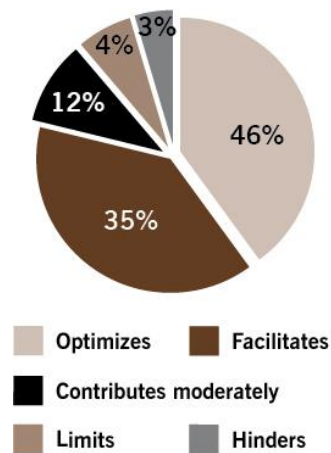
Chart 8. Percentage per categories of use/usefulness of WhatsApp for interpersonal relations of workgroups of university learners.

Regarding the limitations dimension of WhatsApp to form and develop workgroups of university learners (see chart 9), there was a different behavior, but this is due to the fact that the choices in the questions were negatively made, which shows that WhatsApp, according to surveyed learners, supplies more advantages than disadvantages when using it as a supporting tool for teams of academic tasks.
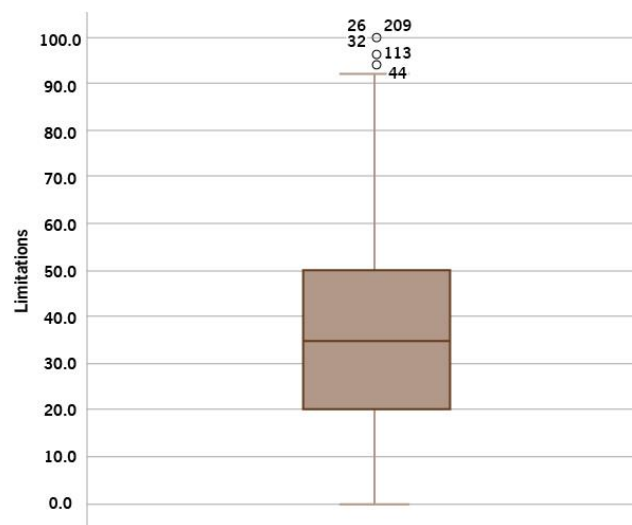

Chart 9. Median box of dimension: WhatsApp limitations.

In this dimension, the minimum was 0 and the maximum was 100. The behavior was similar to that of previous dimensions, but in an inversely proportional manner. The second quartile is the most homogeneous and falls between 21.2 and 34.6 points, with barely 13.4 points, as it ranges between 34.6 and 50.0. The percentile ranging from 0 to 21.22 also is homogeneous, whereas the 75 percentile is the one with greater dispersion, between 50 and 100. There is a similarity between the first and second percentiles, and the categories "hinders" and "limits".

On the other hand, 37% of surveyed learners stated that some of the features of the WhatsApp application limit workgroup formation and dynamics, aspects that may be used as guidance to profile the good use for learning environments (see chart 10); 27% say that, even with likely limitations, it moderately contributes to teams of academic tasks; however, for 23% of learners, these distractions of the tool limit their good development.
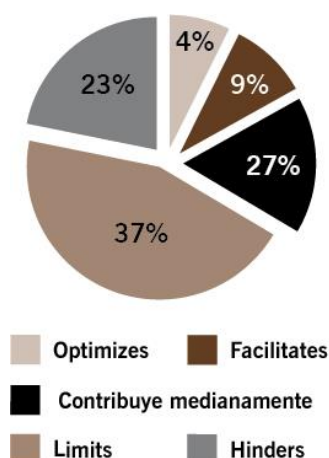

Chart 10. Percentage per limitation categories of WhatsApp for workgroups of university learners.

The biggest obstacles include: difficulty to get several persons to agree (item 49), confusing messages increase conflicts (item 53), and from time to time, it makes them to forget the seriousness of the task to be performed (item 54); that is to say, just as it represents a challenge to have concerns and ends met like any human group, there are barriers and distractors. On the other hand, in spite of the fact that slow action when activating communications causes some conflict or provides better relation among some persons, this does not seem to be an obstacle to use the application.

WhatsApp is an optimizing tool for communication systems and interpersonal relations among learners who are members of academic work teams, it facilitates the formation and organization of these groups, and it is a supplement and support. Limitations are the same as those of any human subjectivity: some barriers, conflicts and challenge of convergence, as well as to seek the agreement of concerns and ends. It seems mostly useful to create a support and solidarity network among learners. This is confirmed as the three dimensions of the variable are correlated (that is, to assume them as factors or variables). By applying Pearson's simple correlation, we find the results on table 5, in accordance with data provided by the survey.

Table 5. Correlation matrix of the dimensions of the variable.

Dimension	Organization of group work	Communication systems	Interpersonal relationships
Organization of group work		0.80	0.78
Communication systems			0.80
Interpersonal relationships			

Logically, given the fact that they are dimensions of a same variable, they are correlated in a positive manner, especially as this is a strong correlation; that is to say, when a dimension moves, the other also move favorably in the same direction. WhatsApp, according to data supplied by the instrument, makes a positive and concomitant promotion of the organization of the workgroup, the communication system and interpersonal relations among university learners as a classroom work supplement. Although there is a minimal difference, the communication system is the key dimension that reinforces the other dimensions, as the result was 0.80 when correlated with the organization of workgroups and interpersonal relations.

The advantage of WhatsApp, in accordance with these results, is that it favors communication and, with this, the conditions are created

and promotes the formation of high-performance work teams, in addition to helping in strengthening interpersonal relations among learners. In so doing, it is an effective tool as a facilitation supplement for the university teacher.

DISCUSSION OF RESULTS

The results show that WhatsApp is a tool used to supplement PCL as it contributes in the development of learners' autonomy and creativity in the organization of workgroups to perform didactic activities and, above all, to strengthen communication systems and interpersonal relations. In addition, it helps, to a large extent, to form small workgroups and to achieve specific activities, punctual and simple goals, to exchange information, clarify doubts, to update information for lagging learners, guidance among learners, and to create a support and solidarity system among learners, such as incentives and encouragement to move forward and to become part of the learning process.

The foregoing notwithstanding, there also are limitations in WhatsApp. According to the results of this survey, to solve and fulfill complex tasks, to settle conflicts among learners or to reprimand learners for not meeting responsibilities, moreover, the purpose of the chat is lost from time to time. On balance, it works when dealing with PCL coordinates, that is to say, when the form of the teacher is closer to that of the facilitator or tutor, and not of a directive instructor. The effectiveness of the tool is when the teacher or the group of learners prefer to work in small teams and with sub-goals or specific tasks, but it turns burdensome when broad and complex goals are set, and when the number participants in the group are in excess, as under these conditions it is difficult to settle conflicts, to apply collaborative learning and to distributive leadership.

WhatsApp is a supporting tool for designing didactic strategies, provided, however, that they be developed for small equipment created by the teacher, and in this sense, consistent with the findings of Padrón (2013). As this is an effective promoting tool, communication facilitates preparation of tasks that are to be prepared in the classroom, or supplementary tasks by means of small groups, and develops the learner's autonomy. In this case, effectivity depends on the tutor's capacity to present specific and manageable didactic activities. This aspect supplements the disclosure of Suárez (2018) and Tapia Repetto *et al.* (2019), who, unlike this survey, did not take the same solution of simple problems

into account to solve complex problems, both in the academic and intersubjective field of learners.

The capability of the tool to exchange information, to clarify debts, to optimize and to make remedial arrangements for lagging learners was a consistent finding in this survey with the investigations of Barhoumi (2015), Vilches *et al.* (2015). López y Castro (2019), Trejos (2018) and Gómez *et al.* (2012).

Supporting the organization and forming teams also was an advantage observed in this survey, which aspect substantiates the results of Hidayanto & Setvady (2014), Villadiego (2014), Serra *et al.* (2017) and Bouhnik & Deshen (2014). Strengthening interpersonal relations and the capacity to achieve distributive leadership and collaborative learning confirm the findings of Gomez & Shafirova (2016).

We agree with Pessoa *et al.* (2016) and Giasanti *et al.* (2016) regarding the facility provided by the tool in the decision-making process. The contribution of our survey is that it is feasible if the tutor or the teacher presents specific problems and challenges by way of sub-goals, and if complex tasks or without any structure are avoided, that are difficult to solve by using WhatsApp, but rather create conflicts among learners.

Regarding limitations, there are no similar backgrounds in the findings of this survey, and they are proper and innovative because they find that this application is not feasible to solve academic or emotional complex problems; that is to say, the tool is effective if the tutor has and mediates specific didactic activities by way of timely sub-goals. Otherwise, this application may have unwanted effects, and turn into an obstacle rather than a learning facilitator.

In promoting and favoring communication systems, WhatsApp contributes to the effective organization of workgroups for academic tasks and to strengthening interpersonal relations to create social supporting networks among learners. That is, this encourages learners' autonomy and creativity, provided, however, that it is about specific tasks and non-complex problems, in addition to the fact that tasks groups are few in number.

Our survey shows that ICTs in education are feasible based on PCL parameters, upon which the tutor mediates the learning activity by the participation of learners and they are granted autonomy, creativity and joint responsibility, with the condition that this is

done by means of specific strategies and didactic activities that are structured and manageable in accordance with the state of development of learners. Solving complex and abstract activities using WhatsApp is not recommended.

CONCLUSIONS

It is evident that the use of ICTs in the learning processes and in the organization of learners is present, both in the formal and informal space. This is the case of using WhatsApp, which is used to share information related with a topic of interest in different formats, to clarify doubts, to organize work teams and to promote digital competencies. In this sense, it aids in facilitating learning as learners are provided with autonomy and responsibility on the development of their competencies, in accordance with their specific interests and concerns; therefore, it contributes to PCL as proposed by Rogers (1982), a theoretical-methodologic approach which becomes effective in this digital age.

In this survey we resorted to the WhatsApp questionnaire to regulate group work with learners of the bachelor degree in Education Sciences and Social Work at a public institution of the State of Hidalgo, Mexico, which allowed us to reach the proposed objective. We have mainly analyzed four aspects: organization, communication processes, interpersonal relations and limitations they face.

Regarding organization, the results confirm that this digital application facilitates communication among the members of a group to plan and perform tasks and activities; it speeds up the processes, it enables the solution of problems that arise, it develops learner-learner and learner-teacher synergy, in addition to favoring the decision-making process.

Regarding communication to prepare group tasks, the results confirm that this technological tool is useful to organize the group, as it favors instant, distant and asynchronous communication; in addition, it enables learners to identify who has received a message and who has read it, in addition to finding a great use to the type of information that is sent in different formats.

When speaking of interpersonal relations that encourage the use of WhatsApp, learners affirm that they are optimized, as there is a facility to interact with a group of persons at the same time, to discuss progress on the development of an activity or task, to share

comments made in class, to ask for help, to clarify doubts, to clear doubts, and to ask for advice in the making of decisions.

In the final aspect on the limitations of the use of WhatsApp, the surveyed learners identified more advantages than disadvantages. One of the limitations they mentioned were distractions from the tool as information is sent that has nothing to do with the topic of study, as they invest time in this kind of activities and did not complete requested tasks; however, it is worth mentioning that they give greater weight to the advantages of this application than to disadvantages of use.

The main finding in this survey is that WhatsApp is a tool used to supplement a teacher's facilitation regarding the organization of group work, the learner-learner, learner-teacher communication system, as well as to strengthening interpersonal relations, provided, however, that the tutor-teacher has and mediates specific didactic activities supported by small groups. In this case, it is important that the teacher makes a collaborative plan with the learners and organizes the learning plan and assessment in a structured manner by means of sub-goals. In other words, WhatsApp is not an effective application to assume complex and general challenges of an academic or personal nature; it is not feasible to solve complicated problems, personal conflicts, or work with a large number of groups. For this reason, it is compatible with PCL.

Our investigation was based on descriptive statistics with a quantitative approach, which allowed us to identify the use of WhatsApp in a general manner, as an application for a mobile device aimed for collaborative work; however, it is interesting for future studies to tackle this phenomenon from a qualitative perspective and to analyze why this is an effective tool when working with small groups and really simple and specific didactic activities, set forth by the teacher as sub-goals. When enhancing communication, WhatsApp provides a positive contribution (0.80) to the organization of work groups and to strengthen interpersonal relations among university learners.

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