RESEARCH AND INNOVATION
REVISTA INTERNACIONAL DE INVESTIGACIÓN
E INNOVACIÓN EDUCATIVA

Andrés Felipe Mena & Sonis María Santoveña. Whatsapp y pautas de interacción en la red durante el proceso de aprendizaje en el aula universitaria

Whatsapp y pautas de interacción en la red durante el proceso de aprendizaje en el aula universitaria

Whatsapp and Formulating Guidelines on Network Interaction during the Learning Process in the University Classroom

Andrés Felipe Mena Guacas.
National University of Distance Education (UNED).
andresfelipemena@gmail.com

Sonia María Santoveña Casal.
National University of Distance Education (UNED).
ssantovena@edu.uned.es

RESUMEN.
Este artículo presenta los resultados preliminares de un estudio que pretende formular lineamientos teóricos y metodológicos para la configuración de entornos de aprendizaje red en aulas universitarias. En particular, se presentan los resultados sobre los niveles de interacción y la correlación con el rendimiento académico, de un curso de postgrado de la Universidad Cooperativa de Colombia, con 27 participantes. El estudio tiene un enfoque mixto, de tipo aplicado y alcance descriptivo. Se diseñó un entorno de aprendizaje presencial que fomenta la interacción; una de las actividades fue en grupos de 4 o 5 personas, en la cual se asignó roles y se utilizó Whatsapp como medio de comunicación. A través de categorías se realizó un análisis de contenido de los mensajes emitidos en grupos de Whatsapp, que permitió medir la frecuencia y calidad de la interacción de una persona en un entorno de aprendizaje, y correlacionarlo con el rendimiento académico. Los resultados muestran dos consideraciones importantes: i) si bien existe una correlación importante entre interacción y rendimiento académico, no es definitiva, y ii) la correlación entre rendimiento académico e interacción es más alta cuando se calcula con base en la frecuencia de participación, que cuando se hace con respecto a la calidad de la misma.

PALABRAS CLAVE.
Interacción, rendimiento académico, whatsapp.

ABSTRACT.
This paper exhibits the preliminary results of a study, which aims to formulate theoretical and methodological guidelines for the configuration of network learning environments in university classrooms. Particularly, results about interaction levels and the correlation with the academic performance, at the postgraduate course of the Cooperative University of Colombia, integrated by 27 participants. The study has a varied approach, applied type, and descriptive scope. A face-to-face learning environment was designed that encourages interaction; One of the activities was in groups of 4 or 5 people, in which roles were assigned and WhatsApp was used as a communication platform . Through categories, an analysis of the content of the messages issued in WhatsApp groups was

INTERNATIONAL JOURNAL OF EDUCATIONAL RESEARCH AND INNOVATION

REVISTA INTERNACIONAL DE INVESTIGACIÓN E INNOVACIÓN EDUCATIVA

IJERI

Andrés Felipe Mena & Sonis María Santoveña. Whatsapp y pautas de interacción en la red durante el proceso de aprendizaje en el aula universitaria

carried out, which allowed one to measure the interaction frequency and quality in a learning environment, and correlate it with academic performance. The results point towards two important considerations: i) although there is an important correlation between interaction and academic performance, there is nothing conclusive about it, and ii) the correlation between academic performance and interaction is higher when it is calculated based on the participation frequency, than strictly the quality.

KEY WORDS.
Interaction, academic performance, whatsapp.

1. Introduction.
Interaction is the central aspect of an educational experience (Garrison and Cleveland-Innes, 2005), because higher functions originate as relationships between human beings (Vygostsky, 1978). One must take measures to stimulate interaction, and the possible addition of group projects and group discussion groups (Enkin and Mejías, 2017); but it is not common to promote interaction in the learning scenarios unless it is done in a conscious and planned manner.

In this work, the scenarios that foster interaction are called Red Learning scenarios. The theoretical basis of network learning is supported on five pillars:

The first is cognitive development. Vygotsky points out that the internalization of higher functions appears twice: "first at the social level, and later at the individual level; first among people (inter-psychological), and then, within the child itself (intra-psychological) "(Vygotsky, 1978).

The second pillar is behavioral learning. According to Bandura (1971), the behavior of the individual is not the exclusive result of the forces that occur inside him or her, nor only of external influences. It proposes that behavior is conditioned by three factors: 1) learning by observation, according to the consequences of the behavior of others, 2) the higher cognitive capacity that allows symbolically to represent external influences and solve problems also symbolically, and analyze the possible consequences of their actions, 3) the self-regulation that all people can exercise to a certain degree.

The third pillar is the theory of social interdependence. According to Johnson and Johnson, "the way in which social interdependence is structured determines how the members interact; which, in turn, will determine the results. Positive interdependence (cooperation) results in encouraging interaction to the extent that individuals encourage and facilitate each other's efforts to learn. Negative interdependence (competition) typically results in an oppositional interaction insofar as individuals discourage and obstruct each other's efforts toward achievement "(Johnson and Johnson, 1989, in Johnson et al, 1997).

The fourth pillar is that of the Red Society of Castells (2009), for two reasons. The first is that networks are organized into nodes and connections. The connections are nothing other than what in this work has been referred to as interaction. The analysis of interaction will allow, firstly, to understand how networks are structured and then, how can the consolidation of networks that enhance learning be fostered. The second is related to the third chapter "Networks of Mind and Power", which based on neuroscience provides a

fundamental premise on how power relations can be reorganized: "Emotion underlines the role of the cognition, while influencing the cognitive process "(Castells, 2009 ; 203).

The fifth pillar is that of connectivism. proposed by Siemens (2004), in which he recognizes that the theory of learning deserves an update, based on the impact of technology on the way of living, communicating, and learning (Siemens, 2004) . "The role of the new user interfaces and the transformations in the interaction between technology and users and among themselves has given social networks and their communication style a significant value" (Rodriguez, 2017; 194).

This theory integrates the principles of the theories of chaos, networks, complexity and self-organization. For this work, the second and the last stand out. That of networks because in connectivism it is recognized that we are connected and that alterations in the network have a wave effect in everything; and, in addition, that knowledge can reside outside the individual and can be accessed through networks. An self-organization, because it highlights the individual, and its ability to regulate one's actions to articulate networks (Siemens, 2004) .

On these pillars learning environments are designed, which are composed of activities, resources, tools, spaces, and of course, the actors. Learning manifests itself when the actors interact with the rest of the components. Designing the environment in terms of interaction involves keeping in mind different elements pointed out by various authors: first achieving a connection with the students, both at the teacher's level and the content that will be offered (Castells, 2009); favoring synchronic and asynchronous encounters (García et al, 2008);that the first encounters are more structured and as the course progresses more autonomously (Moore and Anderson 2003); teacher's speeches that achieve closeness between him or her and the student Gunawardena (1995); initiate the development of topics with group work spaces that allow for socialization, and complement it with individual activities that allow the subject to be internalized (Vigotsky, 1978); propose spaces for interaction with the teacher and spaces for interaction between students (Moore, 1989). Learning by interaction differs from the transaction: the first is an exchange between two actors in which at least one has some commitment to dialogue, while the second involves a strong commitment of the participants to the (Woods and Baker, 2004) dialogue.

Based on the above, in this work interaction is understood as the exchange between the components (people, contents, tools) of a learning environment, which influences the actors involved.

The categories of analysis of the interaction of this work are presented in Table 1, which represent the level of interaction in a learning environment, and were designed from the proposals of Flanders (1973, in Buxarrais, 1989), Osorio and Duart (2011), García et al (2008), Kontos, (1999 , in Buxarrais, 1989), Rafaeli (1988), and García y Suárez (2009).

INTERNATIONAL JOURNAL OF EDUCATIONAL RESEARCH AND INNOVATION

REVISTA INTERNACIONAL DE INVESTIGACIÓN E INNOVACIÓN EDUCATIVA

Andrés Felipe Mena & Sonis María Santoveña. Whatsapp y pautas de interacción en la red durante el proceso de aprendizaje en el aula universitaria

Table 1. Categories of interaction analysis.

CATEGORY	DESCRIPTION
Parallel	When working with another, but not communicating or- messages parallel to the topic of work, such as greetings, farewells, acknowledgments, etc.
Opinion	Communicative flow between two people, in which the messages do not keep coherence
Two way	Response from one individual to another, in which agreement or disagreement is shown, without arguments
Reactive	Coherent response from one individual to another in which agreement or disagreement is shown, with arguments or- simple questions
Complete	Coherent conversation of more than two messages in which agreement or disagreement is shown, with arguments or- Questions elaborated in the framework of a conversation of more than two messages

This article presents the preliminary results of a study carried out to opt for the degree of Doctor in Education of the National University of Distance Education, which aims to formulate theoretical and methodological guidelines for the configuration of network learning environments in university classrooms. In particular, the results on the levels of interaction and the correlation with the academic performance of a postgraduate course of the Cooperative University of Colombia (UCC), are presented, with 27 participants, in which WhatsApp was incorporated as a communication tool.

The application was made with the WhatsApp tool because, on the one hand, it incorporates digital alternatives in the interaction, and because according to the work of Román-Graván (2016), the students "affirm and acknowledge that the implementation of the academic WhatsApp groups in the subjects that are currently taking place in the degrees taught in the Faculty of Educational Sciences would be very beneficial for them and they consider that their creation as support for virtual tutoring would be appropriate and pertinent " (Román-Graván, 2016; 121).

On the other hand, the study of interaction requires taking into account several concepts that give a perspective of broader social analysis.

The first one is the transactional distance, a concept that was introduced in 1983 by Moore, and basically suggests that there is a distance between the student and the teacher, which is not simply geographical, but also educational and psychological (Moore, 1983, in Moore and Anderson 2003). Along these same lines is the concept of immediacy, which refers to communicative behaviors that reduce the perception of distance between

INTERNATIONAL JOURNAL OF EDUCATIONAL RESEARCH AND INNOVATION

REVISTA INTERNACIONAL DE INVESTIGACIÓN E INNOVACIÓN EDUCATIVA

Andrés Felipe Mena & Sonis María Santoveña. Whatsapp y pautas de interacción en la red durante el proceso de aprendizaje en el aula universitaria

people (Thweatt and McCroskey, 1996; in Woods and Baker, 2004). The immediacy can be verbal or non-verbal (Mehrabian, 1971, in Woods and Baker, 2004). This concept is extended to the social presence, which has associated the concepts of intimacy and immediacy, and is defined as the degree of relevance that the other person has in the interaction that is developing and the consequent relevance of interpersonal relationships in the same interaction. The level of intimacy depends on factors such as physical distance, eye contact, smiles, and development of personal topics. The immediacy, on the other hand, is a measure of the psychological distance that the communicator puts between himself or herself, and the person involved of their communication (Short et al, 1976, in Gunawardena 1995).

It is important to establish a difference between competition and rivalry; and between cooperation and help. The competition is aimed at achieving a goal, in which competitors are in second place importance; Rivalry, on the other hand, puts the failure of the other competitor in the foreground. In cooperation, what holds the union is to share the same objective, while in assuming an attitude of aid, what unites is the intention to support the other (Mead, 1937, in Deutsch, 1949). "We must insist that students change their idea of what it means to" help and understand that it is not so much that they solve the other's problems, but to explain the keys for him to do it " (Rodriguez et al, 2017; 173).

The minimum requirement for cooperation is to reduce the egocentric demands of the participants. On the other hand, they are not indispensable: physical closeness, joint actions, synchrony or complementary behavior (Helen Lewis, 1937, in Deutsch, 1949).

2. Materials and methods.

This study has a varied approach, because it integrates qualitative and quantitative approaches. The first one has predominance mainly in the analysis of documentation, characterization of the population, the design of the scenarios, and the description of the dynamics of the same; and the quantitative one in the design of the collection instruments, and the analysis of the interaction information. Following the proposal of Creswell (2003), this study is WHAT + how. The symbol (+) indicates that the approach is being implemented simultaneously or concomitantly, and the capital letter represents the priority methodological design (Creswell, 2003, in Driessnack et al, 2007). It is a study of applied type and descriptive and correlational scope.

2.1. Sample and course design.

The sample consists of 27 students, from the Research in Education course, the postgraduate course in School Learning and Its Difficulties, from the UCC. It analyzed 1,136 messages generated in WhatsApp groups.

For the design of the course, activities organized in phases were prepared, which are articulated in terms of what is expected from a network learning scenario. The phases are: connection, social-initiative, individual-databases, social-current cases, social-asynchronous and individual-closure.

INTERNATIONAL JOURNAL OF EDUCATIONAL RESEARCH AND INNOVATION

REVISTA INTERNACIONAL DE INVESTIGACIÓN E INNOVACIÓN EDUCATIVA

Andrés Felipe Mena & Sonis María Santoveña. Whatsapp y pautas de interacción en la red durante el proceso de aprendizaje en el aula universitaria

From these activities, data was taken from the interaction that was presented in one of them: the social-asynchronous, group activity, of 4 or 5 members. The interaction was carried out by a WhatsApp group, in which the teacher was included as an observer. There were 6 groups in total, and roles were assigned to each participant.

2.2. Instruments.
Two instruments were elaborated for the study: characterization survey, and interaction matrix.

2.2.1. Characterization survey.
The assignment of roles was carried out by the teacher, according to the answers obtained in a characterization survey (in which the participation in the study was also authorized), which asked about profession, time available, activity in which he or she currently works, activities of preference, the way in which one would react in front of certain situations, and a case of analysis. There were 4 roles, and each one was assigned 4 characteristics (2 ways of reacting to problematic situations, and 2 preferred activities) (see table 2).

The last question of the characterization survey is a case of analysis, which leads the student to choose between one of the four roles. The roles were assigned comparing the selected role with the characteristics, following these phases in strict order of priority:
1. First instance: if the characteristics coincide with the role that the student chose, the role he / she selected is maintained;
2. Second instance: if the 2 characteristics of reaction and 1 of preferences coincide with another role that the student did not choose, the role is changed by that new one;
3. Third instance: if the 2 reaction characteristics that the instructor choses are associated with a role, it is unconditionally assigned (it may or may not coincide with the one chosen by the student)
4. Fourth instance: if none of the above applies, the role that the student chose remains

As one goes down the list to assign the role, it is understood that there is less affinity with the role to play. The reaction is prioritized because it is more emotional than mere preferences.

In each group, there should be at least one student per role, so they were assigned according to the steps mentioned above. When the slots were already full and students were needed in another role, they were randomly assigned. It should be noted that only those students assigned to a role in points 3 and 4 of the previous list were randomly assigned. This allowed those who had more affinity with a role to do so. If there was not a clearly adjusted role, one was assigned randomly.

While roles are an important aspect of network learning, they are not the ultimate goal of this study, so that the characterization is allowed for a less random distribution, but it also is not intended to assign roles associated with behavioral profiles or learning styles. .

Table 2. Roles of students in the activity.

ROLE	DEFINITION	CHARACTERISTICS	
		Reaction	preferences
Distributor	Who analyzes and distributes activities among their peers	Propose Search	To plan To follow
Reporter	Who records everything that happens while the proposed task is being developed	Search Analyze	Run to write
Compiler	Who prepares the reports of the work in charge	Analyze Propose	Organize to write
Reviser	Who audits the process	Confrontation Propose	Read To follow

2.2.2. Interaction matrix.

The analysis was made from the interactions that were presented in the WhatsApp group. Each message sent in the group was associated with one of the categories presented in Table 1, through the technique of content analysis, and tabulated in an interaction matrix for each group.

Although the activity was in a group, the interaction was evaluated individually. The aim was to promote the greatest possible interaction among the students, because this would increase the data and allow for a more detailed analysis. In this sense, the interaction had an impact on the activity score: 1 point out of 5 possible, according to the level of interaction. To assess the level of interaction, points were assigned by category, which were then added to know the level reached by each student. Table 3 shows the blank matrix, on which the frequency of each student was filled out.

Table 3. Score by category of analysis.

Category	Frequency	Points for each participation	Maximum possible points	Points reached
Parallel		1	5	
Two way		1	5	
Opinion		3	fifteen	
Reactive		26	78	
Complete		104	n / a	

The score was assigned starting from the minimum possible score: 1. This minimum level is for the parallel and two-way, since basically the achievement is to overcome the purely individual work and approach another, although there is no significant contribution from the two parties. The maximum number of possible points was set at 5. Then there is the mind, which looks for effort and makes a significant contribution, but with no arguments, so that there is still no joint construction, and therefore the points 3; the maximum possible increases in the same proportion, and therefore it reaches 15. In the case of reactive interaction, there is already coherence and arguments, so that a joint construction is achieved; 26 points are assigned, because the sum of the largest possible of the first three categories is 25, so you can only exceed that level if you interact at least once at the "reactive" level. The maximum number of points is 78, because you must interact at least three times in a reactive way to show that you are completely at this level. Following the same logic above, the 104 of the complete interaction is assigned because the sum of the possible maximums of the first four categories is 103, and to move to the level of complete interaction is not enough with the interaction of the previous levels.

3. Results.

Regarding the characterization, the course consisted of 27 students, of which 25 are women and 2 men. 88.9% of them have undergraduate degrees, and the remaining 11.1% with postgraduate degrees. The students of the course present a high academic performance, since 25 of them stated that they have a cumulative career average higher than 4 points out of the possible 5. In general, the participants are employees who study in their available time (25 of the total). Of the 27 participants, only 2 work outside of educational institutions; the rest study in different schools of primary, secondary, and middle school education. 33.3% state that they carry out activities of an administrative nature, while 63% state that they are operational; Only one person said he did not work (3.7%).

After that general context, the results of the last three questions are now presented, related to the characteristics of reaction in problematic situations, preferred activities, and the case of analysis. In the first two it was possible to select two choices offered, therefore, 54 responses were obtained (see table s 4 and 5).

Table 4. Reaction to problematic situations.

Reaction to situations	#	%
I'm looking for all the information needed to understand a problem	13	24.1%
I analyze the situation according to the information available	18	33.3%
I let the other know what I was wrong about	2	3.7%
I propose solutions	twenty-one	38.9%
TOTAL	**54**	**100%**

INTERNATIONAL JOURNAL OF EDUCATIONAL RESEARCH AND INNOVATION

REVISTA INTERNACIONAL DE INVESTIGACIÓN E INNOVACIÓN EDUCATIVA

Andrés Felipe Mena & Sonis María Santoveña. Whatsapp y pautas de interacción en la red durante el proceso de aprendizaje en el aula universitaria

Table 5. Preference activities.

Preference activities	#	%
To plan	10	18.5%
Read	7	13%
Organize	16	29.6%
Write	4	7.4%
Run	7	13%
Track planned tasks	10	18.5%
TOTAL	**54**	**100%**

Regarding the question related to the case of analysis, the case presented was: "You and three other persons are in charge of determining the causes for which the contamination level in Medellín has increased. Choose the role you would assume for the development of this task. "The response options were four, which corresponded to the definitions of the four roles in table 2. Table 6 presents the results of the analysis case.

Table 6. Case of analysis.

Case of analysis	#	%
Who analyzes the work and distributes it among his or her colleagues	9	33.3%
Who registers everything that happens while the work in progress is developed	13	48.1%
Who prepares the reports of the work in development	1	3.7%
Who audits the process	4	14.9 %
TOTAL	**27**	**100%**

Finally, on this instrument, it is important to present the frequencies and percentages with which roles were assigned, for the 4 moments established above (see table 7). There were 6 reviewers, 9 compilers, 6 reporters, and 6 distributors.

Table 7. Roles assigned by moment.

Roles assigned by moment	#	%
1st moment	2	7.4%
2nd moment	9	33.3%
3rd moment	fifteen	55.6%
4th moment	1	3.7%
TOTAL	**27**	**100%**

INTERNATIONAL JOURNAL OF EDUCATIONAL RESEARCH AND INNOVATION

REVISTA INTERNACIONAL DE INVESTIGACIÓN E INNOVACIÓN EDUCATIVA

Andrés Felipe Mena & Sonis María Santoveña. Whatsapp y pautas de interacción en la red durante el proceso de aprendizaje en el aula universitaria

As for the results of the interaction, 1,136 messages sent through WhatsApp groups were analyzed between May 23 and 30, 2017. 77.6% of the messages were written, 21.9% in audio, and the rest 0.5% of another type, such as images or documents or links.

The distribution of messages by role is presented in table 8.

Table 8. Sum of points and messages per role.

Role	Average points per interaction	Average sent messages
Compiler	512.89	35.56
Distributor	930.50	59.17
Reporter	508.33	37.17
Reviser	635.67	39.67

Table 9 presents all the interaction data classified by each student. It is worth mentioning that students are presented with a code consisting of a letter and a number; the latter was assigned in alphabetical order. And in table 10 the interaction data classified by groups are presented. The averages of the notes, points and number of messages are presented, because it is a measure that allows one to understand the general behavior of the group.

Table 9. Points obtained by the interaction and number of messages, for each participant.

Code	Points obtained for the interaction performed	# Parallel messages	# Two-way messages	# Opinion messages	# Reactive messages	# Completee messages	# Total messages
A01	516	9	2	28	3	4	46
A02	512	3	0	7	7	4	twenty-one
A03	410	5	0	10	5	3	2. 3
A04	723	14	1	17	13	6	51
A05	1346	Twenty	0	fifteen	8	12	55
A06	1138	10	0	29	16	10	65
C07	196	2	0	4	3	1	10
D08	1034	8	0	14	19	9	fifty
D09	410	10	0	29	12	3	54
D10	95	2	0	6	4	0	12
D11	307	13	1	18	10	2	44
D12	309	Eleven	3	17	8	2	41
J13	410	9	0	30	4	3	46
L14	619	13	1	27	14	5	60
L15	1138	7	0	33	18	10	68

INTERNATIONAL JOURNAL OF EDUCATIONAL RESEARCH AND INNOVATION

REVISTA INTERNACIONAL DE INVESTIGACIÓN E INNOVACIÓN EDUCATIVA

Andrés Felipe Mena & Sonis María Santoveña. Whatsapp y pautas de interacción en la red durante el proceso de aprendizaje en el aula universitaria

Code	Points obtained for the interaction performed	# Parallel messages	# Two-way messages	# Opinion messages	# Reactive messages	# Completee messages	# Total messages
L16	306	9	0	14	5	2	30
L17	827	6	1	26	4	7	44
M18	271	6	0	2	2	2	12
M19	514	6	0	7	5	4	22
M20	514	6	0	17	3	4	30
M21	95	2	0	17	3	0	22
P22	616	3	0	19	13	5	40
P23	618	7	0	29	8	5	49
S24	1451	13	1	6	6	13	39
S25	410	10	0	29	4	3	46
S26	827	12	1	33	10	7	63
Y27	1451	22	1	37	Twenty	13	93
TOTAL	**17063**	**238**	**12**	**520**	**227**	**139**	**1136**

Table 10. Average of the points obtained by the interaction and the number of messages, by group.

Group	Average points interaction	Average parallel messages	Average two way messages	Average opinion messages	Average reactive message	Average full messages	Average total messages
1	774.25	11.75	0.25	23.75	6.25	6.5	48.5
2	382.75	5.25	0	12.25	5	2.75	25.25
3	385.25	11.5	1.25	19	9.25	2.75	43.75
4	700.2	5.4	0	22.4	12.2	5.8	45.8
5	868.4	11.4	0.8	29.8	eleven	7.4	60.4
6	610.2	8	0.4	7.8	5.8	5	27

All of the interaction information presented in the two previous tables was used to run correlations with academic performance, which are presented in tables 11 and 12. In this case, academic performance is understood as the grade. Correlations were run both for the final grade of the course, as well as for the note of the group activity (where the interaction data was taken). But to avoid biases in the data, an adjustment was necessary: as mentioned above, a part of the note of the group activity corresponds to the level of interaction achieved, so that part of the note was subtracted before running the correlations.

INTERNATIONAL JOURNAL OF EDUCATIONAL
RESEARCH AND INNOVATION

REVISTA INTERNACIONAL DE INVESTIGACIÓN
E INNOVACIÓN EDUCATIVA

Andrés Felipe Mena & Sonis María Santoveña. Whatsapp y pautas de interacción en la red durante el proceso de aprendizaje en el aula universitaria

Table 11. Correlations with individual data.

	Interaction points	Number of parallel messages	Number of two-way messages	Number of opinion messages	Reactive message number	Complete number of messages	Total number of messages
Final note	0.3376	0.3293	-0.0303	0.3675	0.4816	0.3356	0.4770
Note Group activity	0.2156	-0.0759	-0.0736	0.5854	0.4389	0.2114	0.4492

Table 12. Correlations with average group data.

	Interaction in points	Number of parallel messages	Number of two-way messages	Number of opinion messages	Reactive message number	Complete number of messages	Total number of messages
Final note	0.4027	0.1265	0.1855	0.8007	0.9520	0.3923	0.7819
Note Group activity	0.4445	-0.1474	-0.1279	0.7545	0.8206	0.4352	0.6569

4. Discussion.

The general level course was set up to encourage interaction, but only data was taken in one activity, so in subsequent applications it is convenient to think about an interaction analysis throughout the course. The whatsapp alternative is very interesting because the records for the analysis remain, but there are more channels where you are interacting, which should start by identifying and analyzing together.

The number of messages that were presented in the whatsapp group was high, with 1,136. This makes very evident the power of digital tools to favor interaction, above all because of the possibilities of asynchrony that they offer, but also because it is a comfortable and attractive tool for the majority (Román-Graván, 2016, in Campoy and Dopico, 2017), in addition to allowing one to interact at any time and place. The above reflects an important impact of technology in the way of interacting and therefore of learning, as mentioned by Siemens (2004). In addition, it also ratifies the conclusion of Román- Graván (2016), about the importance that students give to the whatsapp tool. For this reason, it is advisable to continue studying in depth the possibilities of interaction through information and communication technologies and their impact on learning.

Interaction has levels, which are reached in so far as certain conditions are satisfied: i) number of messages, ii) measure the issued consistency between them, iii) arguments offered, and iv) those which have a chain of several messages. Without these requirements, one cannot configure high-level interaction. The requirement i is fundamentally the frequency of interaction, while the i, ii, and iii are related to the quality of the same. A differentiation between frequency and quality begins to be established, but it is also understood that both are necessary for high-level interaction. Along the same lines: permanent participation in a scenario is important,

INTERNATIONAL JOURNAL OF EDUCATIONAL RESEARCH AND INNOVATION

REVISTA INTERNACIONAL DE INVESTIGACIÓN E INNOVACIÓN EDUCATIVA

Andrés Felipe Mena & Sonis María Santoveña. Whatsapp y pautas de interacción en la red durante el proceso de aprendizaje en el aula universitaria

but not enough to achieve high level interactions. This is consistent with the proposal of Woodsand Baker (2004), who affirm that the simple transaction is surpassed only when there is a real interest to participate, which is demonstrated with frequency and quality of interaction.

In this application there is a high percentage of responses oriented to the proposal of solutions, but not so much as to let the other know that he or she is wrong (see table 4). This second competence is essential for high-level interaction, as it is associated with the designed argument. When there is no interest in letting the other know that he or she is wrong, there is no interest in contributing to his or her learning. This validates the point made by Rodriguez et al (2017), insofar as explaining to the other the keys so that it can be carried out is not a common practice in learning scenarios. Therefore, one of the main tasks for the promotion of interaction is to promote a conversation with two characteristics: sincere in which it informs the other is wrong, and proactive, to help you understand how you could improve.

The four moments presented for the assignment of roles evidenced a difficulty for the immediate assignment, since more than half were allocated between the third and fourth moment (see table 6). It is expected here that the more quickly roles are assigned, better results in terms of interaction will be presented. But the evidence in this experiment does not confirm it, since of the participants who obtained less than 500 points, 1 was assigned in the first moment, 3 in the second, and 7 in the third. While of the participants who obtained more than 1000 points, 1 was assigned at the first moment, 1 in the second, 3 in the third, and 1 in the fourth. In this sense, the allocation may not be as important, although this is not consistent with the following conclusion, so it is more likely that a more in-depth review of the elements that were taken into account for said allocation is required.

On an average, distributors obtained significantly more points and issued more messages than the other roles (see table 7). This is confirmed by the summation of points from all the distributors, which also shows a score (5583) significantly higher than the rest of the roles, including the compiler that is in second place and had 3 more people than the distributor (4616). Thus, the assignment of roles in a learning environment influences the frequency and quality of the interaction. It is convenient, then, to advance in studies that allow to identify the best way to distribute roles, in order to be associated with the characteristics of each person. But, in addition, the assignment of roles can become a strategy to favor the learning of those who need it most, because with the right role they will interact more, and to that extent their learning can be favored.

The possibility of assigning roles depends in an important way on the active participation of the students, in this case in the survey, for which the characterization must be scheduled with enough time, to collect the data, analyze them and assign the roles.

The greater number of parallel interactions, contrasted with the double-layered gaps (see table 8), suggest that there are more interactions that have no coherence, than answers without arguments. This is usual, also, in academic forums, where monologues are presented around the same topic. In this case it is interesting that the allocation of roles not solved completely. This is consistent with the calls of Zambrano (2010) that the student not only elaborates new information, but also is able to manage it, relate it and re-

INTERNATIONAL JOURNAL OF EDUCATIONAL RESEARCH AND INNOVATION
REVISTA INTERNACIONAL DE INVESTIGACIÓN E INNOVACIÓN EDUCATIVA

Andrés Felipe Mena & Sonis María Santoveña. Whatsapp y pautas de interacción en la red durante el proceso de aprendizaje en el aula universitaria

elaborate it. The Learning Network scenarios must be concerned with the processing of information, not only by the dissemination of it.

Theoretically, the contribution of interaction to learning is relevant, but in this experiment it can be pointed out that the impact is not so clear, since the correlation of the points obtained by the interaction (quality of the interaction), with the academic performance are not significant either at an individual or group level. Regarding the number of messages (frequency), the low correlation is maintained at the individual level, but reaches an important 0.78 and 0.65 in the group (see tables 10 and 11). Of all forms, the correlation is highest in the group in the individual analysis, suggesting that the interaction produces a greater improvement in the single set. In this sense, the positive interdependence pointed out by Johnson and Johnson (1989, in Johnson et al, 1997) has a greater impact on the members seen as a whole, than on an individual level. The interaction, then, favors the average academic performance of the course, although it has differentiated impacts at the individual level.

Another aspect to be highlighted is that in individual and group cases there is a greater correlation of performance with the number of messages (frequency), than with the points of interaction (quality) (see tables 10 and 11). This is reinforced when analyzing the correlation of performance with reactive and opinion messages, since they are not the highest quality ones, but the ones with the highest correlation; even if, the only really significant correlation is the final grade with messages of reactive level. But, in any case, it is also important to show that messages of low quality have the lowest correlation with academic performance.

According to the results (see tables 10 and 11), the interaction of medium level (opinion and interaction) is the one that contributes most to learning . When compared with the interaction of the lower level, it is natural to think that the medium level contributes more to learning, but when compared to the higher level does not seem so natural. There can be several explanations, one possible is that those who interaction at the highest level do so little, and that means there is less commitment to the academic process, while those who do it at the middle level interact more frequently and therefore the commitment is greater . In the work of Salgado et al (2013) there is an important correlation between performance and commitment; they carry out the analysis, understanding commitment as an integration of vigor, dedication, and absorption. The highest correlation is presented with the vigor element, which is composed of these items: in the school I feel full of energy; I am strong and vigorous at my school; When I get up in the morning I feel like going to school: I can continue studying in my school activities for long periods of time; I am very persistent in my school activities; even when things are not going well; I continue with my studies or the given school activities. When students interact more, they would also be more likely to meet the aforementioned strength items, and in that sense there may be better academic performance.

References

- Bandura, A. (1971) *Social Learning Theory*. New York City: General Learning Press.
- Buxarrais, M. (1989). Análisis de la interacción profesor-alumno como catalizadora del proceso de aprendizaje. *Revista de educación,* (288), 419 - 428. Recuperado de: https://www.mecd.gob.es/dctm/revista-de-educacion/articulosre288/re28819.pdf?documentId=0901e72b813ca2a6
- Campoy, R. y Dopico, E. (2017). Estrategias inclusivas desde la educación de adultos. Recuperado de: http://digibuo.uniovi.es/dspace/bitstream/10651/43607/6/TFM_RaquelCampoyCarbajales.pdf
- Castells, M. (2009). *Comunicación y poder*. (Traducción de María Hernández, 2009) Madrid, España: Alianza editorial.
- Deutsch, M. (1949). A Theory of co-operation and competition. *Social Science Collections*. Recuperado de: https://app.luminpdf.com/viewer/k4HnXbCfgQ2eT28T3
- Driessnack, M., Sousa, V. y Costa, I. (2007). Revisión de los diseños de investigaciones relevantes para la enfermería: Parte 3: Métodos mixtos y múltiples. *Revista Latino-americana de Enfermagem. (5),* 1 - 4. Recuperado de: http://www.scielo.br/pdf/rlae/v15n5/es_v15n5a24.pdf.
- Enkin, E. y Mejías-Bikandi Errapel (2017). The effectiveness of online teaching in anadvanced Spanish language course. *International Journal of Applied Linguistics*, (27), 176 – 197.
- García, A. y Suárez, C. (2009). Interacción virtual y aprendizaje cooperativo. Un estudio cualitativo. *Revista de educación* (354), 473-498. Recuperado de: http://www.revistaeducacion.mec.es/re354/re354_19.pdf.
- García, B., Márquez, L., Bustos, A., Miranda, G. y Espíndola, S. (2008). Análisis de los patrones de interacción y construcción del conocimiento en ambientes de aprendizaje en línea: una estrategia metodológica. *Revista electrónica de investigación educativa* (10), 1-18. Recuperado de: http://www.scielo.org.mx/scielo.php?script=sci_arttextypid=S1607-40412008000100003ylng=esytlng=es
- Garrison, D. y Cleveland, M. (2005). Facilitating Cognitive Presence in Online Learning: Interaction Is Not Enough. *The american journal of distance education* (3), 133 - 148. Recuperado de: http://www.anitacrawley.net/Articles/GarrisonClevelandInnes2005.pdf.
- Gunawardena, C. (1995). Social Presence Theory and Implications for Interaction and Collaborative Learning in Computer Conferences. *International Jl. of Educational Telecommunications (1),* 147-166. Recuperado de : https://www.learntechlib.org/p/15156
- Johnson, D., Johnson, R. y Smith, K. (1997) El Aprendizaje Cooperativo regresa a la Universidad: ¿qué evidencia existe de que funciona? Recuperado de: http://www.javeriana.edu.co/prin/sites/default/files/Johnson_Aprendizaje_cooperativo_en_la_universidad.pdf
- Moore, M. (1989) Editorial: *Three types of interaction*. *The American Journal of Distance Education (3),* 1-17.
- Moore, M. y Anderson, W. (2003). *Handbook of Distance Education. Mahwah*, NJ: Lawrence Erlbaum Associates. Recuperado de: http://ltc-ead.nutes.ufrj.br/constructore/objetos/Handbook_Of_Distance_Education.pdf

Fecha de recepción: 27-02-2018 Fecha de aceptación: 02-10-2018
Mena-Guacas, A. F. & Santoveña, S. Mª. (2019). Whatsapp y pautas de interacción en la red durante el proceso de aprendizaje en el aula universitaria
International Journal of Educational Research and Innovation (IJERI), *11*, 121-136
ISSN: 2386-4303

Página **135**

- Rafaeli, S. (1988). *Interactivity: From new media to communication*. En Hawkins, R., Wiemann, J., y Pingree, S. Advancing communication science: merging mass and interpersonal processes. California: Sage publications, 110-130.
- Rodriguez, D., García D. y Rubia, D. (2017). Análisis de las interacciones en entornos comunicativos de aprendizaje. Estudio de un grupo de escolares 4º curso de Educación Primaria. *Revista Nacional e Internacional de Educación Inclusiva. (10)* 161-180. Recuperado de: http://revistaeducacioninclusiva.es/index.php/REI/article/view/304/292.
- Rodriguez, R. (2017). Una experiencia de interacción crítica y reflexiva a propósito de una campaña sobre Twitter en la asignatura de Teoría del Derecho. *International Journal of Educational Research and Innovation - IJIERI.* (7) 186 – 201. Recuperado de: https://www.upo.es/revistas/index.php/IJERI/article/view/2324/1889.
- Román-Gravan, P. (2016). Sistemas de comunicación alternativos en tutoría virtual: los grupos de WhatsApp en la docencia universitaria. En Gómez, A. (Coord.). *La alfabetización multimodal: nuevas formas de leer y escribir en el entorno digital* (121 – 132). Madrid: Editorial Síntesis.
- Salinas, J. (2004). Innovación docente y uso de las TIC en la enseñanza universitaria. *Revista universidad y sociedad del conocimiento.* (1). Recuperado de: https://www.uoc.edu/rusc/dt/esp/salinas1104.pdf.
- Siemens, J. (2004). *Conectivismo: Una teoría de aprendizaje para la era digital.* (Traducción de Diego Leal, 2009). Recuperado de: http://clasicas.filos.unam.mx/files/2014/03/Conectivismo.pdf.
- Vigotsky, L. (1978*). El desarrollo de los procesos psicológicos superiores* (Traducción de Silvia Furió, Ed. 2009). Barcelona, España: Crítica.
- Woods, R. y Baker, J. (2004). Interaction and Immediacy in Online Learning. *International Review of Research in Open and Distance Learning, (5),* 1-13. Recuperado de: http://www.irrodl.org/index.php/irrodl/article/view/186/268.
- Zambrano, W., Medina, V. y García, V. (2010). Nuevo rol del profesor y el estudiante en la educación virtual. *Dialéctica revista de investigación,* (26), 51 - 61. Recuperado de: https://dialnet.unirioja.es/servlet/articulo?codigo=3340102