

Edmodo, social network as a model for knowledge management

Augusto José Ángel Moreno

Master's degree in Teaching. Faculty of Engineering and Basic Sciences

Los Libertadores University Foundation, Bogotá, Colombia.

<https://orcid.org/0000-0002-6136-9886>

https://scienti.minciencias.gov.co/cvlac/visualizador/generarCurriculoCv.do?cod_rh=0001544108

aujangel@gmail.com

Flor Nancy Díaz Piraquive

Doctorate in Computer Engineering. Faculty of Engineering

Catholic University of Colombia, Bogotá, Colombia.

<https://orcid.org/0000-0002-5966-6224>

http://scienti.colciencias.gov.co:8081/cvlac/visualizador/generarCurriculoCv.do?cod_rh=0001202146

findiazp@gmail.com

Abstract

In today's world both the Internet and ICT play a crucial role in all aspects of society. With the development of social networks, the way of communicating has changed, and this does not exclude educational environments. In the framework of e-learning, educational social networks have emerged as a tool that allows overcoming spatial and temporal barriers. A knowledge management model was applied to students in the programming area of three private universities in Bogotá, Colombia, taking a sample of 76 students, from which an experimental group and a control group were taken, quantitative evaluations were made of aspects such as student participation and academic performance, in addition to a qualitative assessment of the model that was applied to students and teachers of the experimental group. It is observed that the model improves both group and individual participation, as well as academic performance, facilitating also the execution of the program in the established time and making communication between students and teachers more fluid. The conclusions allow to know that the model is superior to the traditional model and widely accepted by both students and teachers.

Keywords: Information and Communication Technologies; Educational Social Network; Knowledge Management Model; e-Learning, b-Learning.

Resumen

En el mundo actual tanto internet como las TIC juegan un rol crucial en todos los aspectos de la sociedad. Con el desarrollo de las redes sociales se ha cambiado el modo de comunicarse, esto no excluye a los ámbitos educativos, en el marco del e-learning se ha dado el surgimiento de las redes sociales educacionales, las cuales son una herramienta que permite superar barreras espaciales y temporales. Se aplicó un modelo de gestión del conocimiento a estudiantes del área de programación de tres universidades privadas en Bogotá, Colombia, tomando una muestra de 76 estudiantes, de los cuales se toma un grupo experimental y un grupo control, se realizan evaluaciones cuantitativas de aspectos como la participación de los estudiantes y su rendimiento académico, además de una valoración cualitativa del modelo que fue aplicada a estudiantes y docentes del grupo experimental. Se observa que el modelo mejora la participación tanto grupal como individual, así como el desempeño académico, facilitando además la ejecución del programa en el tiempo establecido y haciendo más fluida la comunicación entre estudiantes y docentes, se concluye que el modelo es superior con respecto al modelo tradicional y ampliamente aceptado tanto por estudiantes como docentes.

Palabras clave: Tecnologías de la información y la Comunicación; Red Social educativa; Modelo de Gestión del Conocimiento; e-Learning, b-Learning.

1. Introduction

In 1960 there was a break in the model of traditional higher education, since there was an increase in the demand for this type of education, mainly due to the emergence of a new demand for access to education by the previously relegated social classes, which causes that the institutions in charge of providing higher education such as universities and technical institutes, fail to respond adequately and effectively to this emerging need, mainly due to lack of infrastructure, resources and inadequate organization, and this situation demands to rethink the way to manage knowledge (García-Aretio, 2014).

On the other hand, the paradigm of education changes from being conceived as a unidirectional process where the teacher was the one in custody of the knowledge and the one in charge of supplying the information and knowledge to the student, who was only a mere receiver of disjointed information, which in many cases became a superficial knowledge that he did not know how to apply to consider the student as an active subject in the learning process, able to influence his process and even self-manage it, and not simply as a mere receiver of information. This situation has obviously brought a change in the educational paradigm as well as in the models of information and knowledge management,

generating, therefore, a change in the way of teaching (Suárez Riveiro & Anaya Nieto, 2014).

The need to overcome these drawbacks and democratize education and access to knowledge, has led the education sector to be a dynamic sector in constant transformation, so it must make use of the communicative and technological resources that are appearing. This is why distance learning is not something that is totally new or exclusive to this century, but on the contrary, it has been changing as new technologies and especially new media and communication alternatives appear. It is then stated that this mode of education outside the classroom and without the need for direct contact between learner and teacher dates from long ago, when for example, in 1840 Pitman taught shorthand through the use of postal mail (Al-Qahtani & Higgins, 2013).

Distance learning arises as a solution to the need to transmit knowledge without having to congregate in classrooms or have physical contact with an instructor or teacher, which implies traveling and, therefore, overcoming numerous geographical barriers to access education and, consequently, knowledge. The emergence of this mode of education initially benefits from writing, which allows the transmission of ideas and knowledge in a codified way so that other people with the ability to decode it, in this case, the ability to read, can understand what is to be transmitted without having to be in the presence of the person who wants to transmit it. On the other hand, it initially benefited from developments such as the printing press and postal mail, which allowed information to be replicated on a massive scale and, in addition, opened the possibility of reaching remote places and disseminate it (García-Aretio, 2014).

2. Methodology

The purpose of this research is to develop and evaluate a model of knowledge management through an educational social network in the area of programming, to strengthen the education and training processes applied in some private higher education institutions in Bogota, as well as to determine and measure different variables that allow understanding the efficiency of the development of a topic of an academic space supported by the use of social networks and characterize the educational experience of university teachers and students in social networks, particularly the Edmodo social network for the area of programming.

Three private higher education institutions in Bogota, duly recognized by the national and district educational bodies, are taken as a sample to carry out the research project. From these three educational entities, 6 groups of the basic core subject "programming" are taken, corresponding to 76 students and 3 professors. From the total sample, two groups will be extracted for the analysis of quantitative variables.

An experimental group will be formed by students using the Edmodo social network as a complement to classroom activities following the teacher's guidance, the quantitative data of this group will be taken directly from the metrics of the social network. For the purposes of the analysis, it will be called GRS - (Social Network Group).

A control group which will be made up of students taking only traditional classes, that is, only in the classroom, the quantitative data collection of this group will be done according to the teacher's report with the instruments designed for this purpose. For the purposes of the analysis, it will be called GT - (Traditional Group).

In the case of qualitative variables, these will be done only in the experimental group, both students and teachers, since the qualitative perception that each student and teacher has of the social network will be evaluated in terms of its contribution to the teaching-learning process, therefore, it does not require a control group.

Based on the qualitative and quantitative approach that serves as the basis of this study, a series of variables are established based on the metrics of the social network and the monitoring of the development of the academic space in the classroom. These variables of a quantitative nature (VC) will allow measuring the efficiency of the implementation of the social network in the development of the subject. On the other hand, the qualitative approach variables (VQ) will provide the perception of students and teachers on the use of the social network.

The *quantitative variables* will be collected through instruments given to each teacher, who will fill them out according to the activities carried out and the parameters given to the teachers during the training, while the *qualitative variables* will be collected through a survey-type instrument based on a *Likert scale* for subsequent analysis.

The following table shows the quantitative variables, as well as the labels assigned to each of them.

Table 1. Relationship of variables and labels.

Variable	Label
TR	Response time
PG	Percentage of group participation
PI	Percentage of individual participation
EC	Surveys and consultations

EP	Percentage of program execution
TA	Time Saved
Age	Age
Rating	Rating
DA	Academic performance

Source: own elaboration.

The instruments for measuring the perception of students and teachers in relation to the application of the educational social network Edmodo in the development of one of the topics of the *subject "programming"*, will be *surveys by means of closed questions*, using the *Likert-type scale*, with *scales from 1 to 5* according to the favorable or unfavorable condition of each of the questions, the construction of this scale was justified by the need to develop *attitudinal indicators and tastes*, which *would allow predicting the behavior of these groups of professionals*. The *Likert scale* is frequently used for this type of measurements because it is considered easy to elaborate; in addition, it will allow achieving high levels of reliability and requires few items while others will need more to achieve the same results.

Additionally, these surveys will classify the sample participants according to gender, age and working day. The postulates of the survey will be very similar to those identified in the study by Deperlioglu & Kose (2013) and some will be added, according to how the study is developed, it should be noted that since this is an evaluation instrument, its application will be done at the end of the study.

3. Results and analysis

Once the databases with the complete variables are obtained, the results are extracted by defining the mean and standard deviation for each of the variables discriminated by each of the groups, and Student's t-tests and Levene's t-tests are performed to evaluate the equality of variances between the two groups, as well as the significant differences.

3.1 Quantitative variables

3.1.1 TR Variable

It is observed that the response time was shorter for the group that used the Edmodo social network, with the mean being one point higher, as shown in Table 2.

Table 2. Response time (hours) by group.

<i>Group</i>	Response time (hours)		
	<i>Media</i>	<i>N</i>	<i>Standard deviation</i>
Social Network	1,61	38	0,495

Group			
Traditional Group	2,61	38	0,495
Total	2,11	76	0,704

Source: own elaboration.

This situation may be due to the ease that the social network offers for communication between students and teachers, since by carrying out the activities through the tools available in the social network, students do not need to coincide temporally or spatially, but on the contrary, each of them can manage their time to perform the activities instead of waiting between one class and another to perform them, thus optimizing the time of both students and teachers. In addition to democratizing participation by not having a time limit for participation as it is in the classroom.

3.1.2 PG variable

It was observed that the GRS group had 20% more group participation than the GT group. This shows the benefit of social networks for the dynamization of classroom processes, by eliminating situations of pressure or shyness in students that reduce participation, sometimes turning the classroom into a hostile environment, where participation occurs in a small group of students.

Since the opportunity to participate is not mediated by class time and by the immediate direction of the teacher, a range of participation options opens up for students more in accordance with their personal dynamics and time availability, without having spatial, geographic or temporal barriers that prevent or limit their interaction options with both the teacher and the other students.

3.1.3 PI variable

For this variable, the difference between GRS and GT is quite dramatic, as shown in Table 3.

Table 3. Percentage of individual participation.

Percentage of individual participation			
Group	Media	N	Standard deviation
Social Network	70	38	0,000
Group			
Total	60	76	0,000

Source:
elaboration.

own

Table 4. Percentage of group participation.

Percentage of individual participation			
<i>Group</i>	<i>Media</i>	<i>N</i>	<i>Standard deviation</i>
Social Network Group	87.63	38	1,330
Traditional Group	45.56	38	1,234

Source: own elaboration.

There is 42.1% more individual participation in the GRS group than in the GT group. This is quite positive since the classroom can be intimidating (Henry, 2012), causing students to desist from participating due to fear or other psychosocial factors. On the other hand, this difference may be due to the greater ease of participating through the social network, since by eliminating temporal and spatial barriers the student can do so at the time that is most convenient for him/her and, therefore, when he/she is better prepared for it, academically, psychologically and socially, thus improving the quality of his/her participation as well as the academic dynamics, and consequently, decreasing the fears and stress associated with these situations.

3.1.4 EC Variable

This variable shows that twice as many consultations were performed in the GRS group as in the GT group.

This behavior is due to the ease of use of the social network for this type of consultations outside of class, while the GT group had to perform this type of activities inside the classroom, thus spending the time allotted for the development of the topics of the subject, so that both teachers and students can generate a tendency to refrain from both conducting and participating in this type of surveys and consultations, thus losing the possibility of making the course of the subjects a little more dynamic.

3.1.5 EP Variable

It was observed that in the case of the GRS group, 16% more of the programmed subject content was developed with respect to GT.

Table 5. Percentage of program execution.

<i>Group</i>	Percentage of program execution % of program execution		
	<i>Media</i>	<i>N</i>	<i>Standard deviation</i>
Social Network Group	76.84	38	,764
Traditional Group	60	38	,000

Source: own elaboration.

This shows the potential of the social network for a more effective development of the contents of the academic space in the stipulated time, allowing activities to be developed outside the classroom, therefore, it shows the optimization of time in the classroom that the implementation of this type of knowledge management models presents with respect to the traditional model.

3.1.6 TA variable

In this variable it was observed that while the GRS saved a total of 3 hours in the cut in which the study was carried out, the GT did not save time.

Table 6. Time saved.

<i>Group</i>	Time Saved		
	<i>Media</i>	<i>N</i>	<i>Standard deviation</i>
Social Network Group	3	38	,000
Traditional Group	0	38	,000

Source: own elaboration.

This time saving is due to and is related to previous variables such as response times and surveys and consultations through the social network, since as mentioned this generates an optimization of class time, and on the other hand, the increased participation through the social network is equivalent to having students more prepared and motivated to receive the

subject matter in the classroom, feeling more autonomous and confident in the management of their own learning.

3.1.7 Rating variable

For this variable, it was observed that the mean score was 0.269 points higher for GRS than for GT.

Table 7. Rating variable

<i>Group</i>	Rating		<i>Standard deviation</i>
	<i>Media</i>	<i>N</i>	
Social Network Group	4.237	38	,0396
Traditional Group	3.968	38	,0438

Source: own elaboration.

Although grades cannot be taken as a true reflection of the students' learning process, they are an approximation of it and a way to measure the effectiveness of the processes, as well as the students' performance. Thus, it can be observed that the use of the Edmodo social network and the application of the knowledge management model described in this study can positively affect students' academic performance. This, however, cannot be attributed to a single factor, but rather to the multiple benefits of the social network that generate a synergy to lead to a more dynamic and deeper learning process that is reflected in improved grades and academic performance of the students involved.

On the other hand, it is observed that in general, the GRS group obtained better results in the quantitative variables with respect to the GT group, which indicates that the implementation of the knowledge management model with the Edmodo social network contributes in a broad way to improve the academic dynamics and, therefore, enhances the knowledge management models, leading to an improvement in the academic performance of students both individually and as a group, which has the potential to later have an impact on their performance both in more advanced stages of their careers and in their working life.

3.2 Qualitative variables

3.2.1 Qualitative variables of the student group

Regarding the descriptive variables, it was found that the two groups are similar to each other and, therefore, it is valid to make comparisons between them since they are statistically equivalent.

Question 1 (Q1): I enjoyed the learning process with the social network.

For this variable, it was observed that the mean score was 4.45/5, which indicates a high level of agreement with the statement, i.e., in general, the students saw the use of the social network in the development of the subject as an enjoyable process.

It is also observed that 50% of the students scored this question with a 5, which means that at least half totally enjoyed their learning process with the use of the social network, it is also observed that no student scored this question with 1 or 2, that is, none totally disagreed, however 5.3% of the students referred to neither agree nor disagree with the statement, which could indicate a certain indifference and some minor degree of resistance on the part of some students to the implementation of the social network as part of their learning process.

Question 2 (Q2): This knowledge management model is more effective than the traditional model.

This variable seeks to evaluate the students' appreciation of the model with respect to the traditional model of face-to-face classes; the mean for this question was 4.21/5, which represents a high level of agreement with the statement.

This means that in general, students believe that the applied model is more effective than the traditional model and, therefore, more beneficial to their learning process. However, it is observed that 2.6% referred to partially disagree, which could indicate that for some students this model does not surpass the traditional education model. This may also be due to some kind of resistance to the implementation of the new model, as well as lack of motivation and interest or even some limitation or particular difficulty of students to access the platforms to perform the activities proposed by the social network. It is observed that 39.5% totally agree and 44.7% partially agree, which could indicate that even though they believe that the implemented model is more effective than the traditional model they may have some suggestions to improve the model and make it even more effective.

Question 3 (Q3): I would like to participate in this type of study again.

For this variable a score of 4.16/5 was obtained, indicating a high level of agreement with the statement, i.e., in general students are interested in participating again in studies on learning models with virtual components, which also indicates a high interest in the implementation and development of these models in their academic environments.

However, it is observed that 15 should not be taken as a negative aspect, since although it does not indicate that this part of the population would be interested or motivated to participate in these studies, it does not indicate a refusal or resistance to participate in more similar studies, therefore, it is a level of indifference on which one could work with motivation so that students are interested in contributing, even autonomously in the development of future studies on the same or similar topics.

Question 4 (Q4): My academic goals were achieved with this model.

In this variable, a mean of 4.05/5 was obtained, although it is lower than the score obtained in the previous variables, it reflects a high acceptance of the statement. In contrast, it is observed that 5.3% of the students said they partially disagreed and another 5.3% neither agreed nor disagreed, that is, that this fraction of students did not feel they had achieved their academic goals with the implemented model, while 68.4% partially agreed and 21.1% totally agreed, so that in general terms the students considered that their academic goals were carried out satisfactorily. In contrast to the results of this variable with the previous variables, in which a positive perception of the implemented model is observed, it may account for an alteration of the learning process due to external variables not contemplated and possibly individual for each student, such as difficulties in accessing the platform, whether technological, temporary or motivational, among others.

Question 5 (Q5): Edmodo helps me learn more efficiently in my free time.

This variable obtained an overall score of 4.08/5, which represents a high level of agreement with the statement. However, when analyzing the percentages by score, it is observed that 23.7% reported neither agreeing nor disagreeing, that is, although they do not believe that Edmodo harms their learning, neither do they feel that it is more efficient to learn in their free time, this may be due to some resistance, on the part of the students, to the implementation of the model, as well as lack of motivation or personal characteristics or individual situations, however, it is observed that a high percentage of 31.6% also totally agree with the statement, and 44.7% partially agree with it, that is, that the majority of students do not feel that Edmodo is more efficient to learn in their free time. 6% totally agree with the statement, and 44.7% partially agree, meaning that most students saw in the Edmodo social network an effective tool to improve their autonomous learning outside the classroom.

Question 6 (Q6): Edmodo increases my opportunities for participation.

For this variable, a score of 4.18 was obtained, which represents a high level of agreement with the statement, that is to say that general students consider that Edmodo

allows them to participate in a more timely and effective way with respect to the traditional classroom. It was also observed that 39.5% totally agreed and another 39.5% partially agreed, i.e., 79% of the students feel that Edmodo allows them to participate more effectively than the traditional model, this is important because as mentioned, the classroom can be an intimidating and in some cases inequitable environment in which participation becomes a matter of a few. Therefore, if students feel that they have more opportunities to participate through the social network, they have the potential to improve the dynamics of both the classroom and the activities carried out through the social network, which will be reflected in the improvement of the learning and teaching processes.

Question 7 (Q7): This knowledge management model should be applied in more courses.

In this case, a *Likert scale* score of 4.24/5 was obtained, that is, there is a high level of agreement with the statement, therefore, students would consider it beneficial that the model applied in this study be applied to other courses in their career. Additionally, 39.5% of the students referred to totally agree with the statement and 44.7% partially agree, which reinforces the positive perception of the students regarding the implementation of the model in other subjects.

When analyzing the overall scores obtained, it can be affirmed that although there is a small resistance to the implementation of the model on the part of the students, which as mentioned above may be due to various situations beyond the scope of the study, this resistance is small and is limited to no more than 5% of the student population, The acceptance of the model is high by the students, who consider the model effective and useful because it contributes to improve the development of the subjects, improves communication and therefore, the dynamics both in the social network and in the classroom, also enhancing academic performance and learning in the students' free time.

3.2.2 Qualitative variables of the group of teachers.

Question 1 (Q1P): I enjoyed the teaching process with the social network.

This variable had a score of 5/5, i.e., the teachers saw the teaching process with Edmodo as a pleasant experience, which, in addition, suggests the willingness of the teacher to implement these new models as support for their teaching strategies.

Question 2 (P2P): This knowledge management model is more effective than the traditional model.

This variable also had a score of 5/5, i.e., the teachers consider that the model implemented with the Edmodo social network makes the teaching-learning process more effective. This perception on the part of the teachers is important in that it is the teachers who instruct and motivate the students in the use of the social network for their academic duties.

Question 3 (Q3P): I would like to participate in this type of study again.

This variable had a lower score than the previous variables, 4.67/5, which may be due to a particular situation of a teacher in which, although he/she may be interested in participating in more studies of this type, he/she is not totally interested, either due to individual circumstances or situations such as lack of time or motivation. However, the score shows a good level of motivation and interest on the part of the teachers in the knowledge management model implemented.

Question 4 (Q4P): My teaching goals were achieved with this model.

This variable had a score of 5/5, meaning that the teachers consider that the model allowed them to carry out all their teaching goals set for the academic period evaluated, i.e., that the model positively affected the work of the teachers, allowing them to carry out their academic plans satisfactorily.

Question 5 (Q5P): Edmodo helps me teach more efficiently.

This variable had a score of 5/5, which indicates that the teachers consider Edmodo as a tool that makes their teaching more efficient, therefore they consider it a useful tool and it shows the adequate implementation of the model, as the teachers, whose opinion may be less biased with respect to that of the students, where personal aspects or aspects inherent to the contents of the subject and the taste for them may intervene, consider that the model makes the teaching-learning process and the management of knowledge more efficient.

Question 6 (Q6P): Edmodo increases my opportunities for interaction with students.

This variable had a score of 5/5, which indicates that teachers perceived that Edmodo improves student participation with respect to the traditional model, allowing fluid communication and interaction between students and teachers, eliminating barriers both temporal, spatial and even social or personal, by allowing a more democratic interaction and, consequently, improving classroom dynamics.

Question 7 (Q7P): This knowledge management model should be applied in more courses.

This variable had a score of 5/5, which indicates that teachers consider it pertinent that the knowledge management model designed be applied to more courses, thus opening the door to further research and the implementation of these models at higher levels such as the institutional level.

It can be observed by analyzing the results of the *Likert scale* applied, that teachers are satisfied with the implemented model. They see in the Edmodo social network an efficient tool in terms of improving classroom dynamics and it is useful in their teaching work, being also a suitable tool for communication with students, making it more fluid and diverse.

4. Conclusions and Recommendations

It was observed that the benefits of implementing these management models of those referred to in the literature were evident for the group analyzed, among which, broadly speaking, the most noteworthy are the improvement in both individual and group participation, the improvement of grades and the optimization of time in the classroom.

The improvement in academic performance, which is observed as higher grades in the group using the Edmodo social network, is an extremely important finding, as it allows us to conclude that the knowledge management model applied, and therefore, the Edmodo social network, has the potential to improve the learning processes which leads to better grades and performance by the students. However, grades are nothing more than numbers, and what is really important is that this reflects that the social network generates more fluid and effective learning dynamics, where knowledge management occurs in a deeper and more conscious way, by the students, thus leading to a more relevant and lasting knowledge in time, which will eventually produce new knowledge both in the student and in the academic institutions. Therefore, by repeating these processes over and over again, the result will be an optimization in knowledge management at the level of the institutions and consequently, an improvement in the quality of education that will be reflected in the quality statistics and in the academic production of higher education institutions.

The fact that the implementation of Edmodo presents an optimization of classroom time is of great relevance in this study, taking into account the particular situation of the city of Bogota, as it demonstrates the potential of these models to improve learning processes in

situations of difficult access to campuses and traditional classes, whether these limitations are geographical or, as in the case of Bogota, due to difficulties in transportation and mobilization of its citizens.

Edmodo allows response times to be more effective in academic dynamics, which also contributes to the optimization of time not only in the classroom but also in the students' free time. This presents an advantage in that students during their self-study time, in case of any doubt or need for guidance from the teacher, can formulate it immediately, and the teacher can respond as soon as possible, contrary to what would happen in the traditional model, where the student would have to wait until the next class to formulate his doubts, during which time he could be discouraged from requesting advice or simply forget about it if he has no record of it, even from an optimistic point of view in which the teacher has additional office hours to class hours, the student would have to travel to the campus and the teacher's office to formulate their concerns, which can be frustrating and demotivating, especially taking into account the immediacy and certain ubiquity offered by social networks.

It is also observed an improvement in the self-study component performed by students through the educational social network, which has been described in other studies, particularly by Bernárdez-Rodal (2006), since students report that the social network improved their learning during free time, that is, the efficiency of the time outside the classroom that they invest in reviewing and/or studying the contents of the subject, in addition to their autonomy, i.e., it makes students take a more serious and influential role in their own learning process; This also influences the optimization of class time, since by optimizing self-study time, students arrive much more prepared to face-to-face classes, where there are more active dynamics focused on collaborative learning, democratizing participation in the classroom.

According to Collazos& Mendoza (2006), it was observed that the collaborative learning implicit in the applied model and in the Edmodo social network improved the academic performance of the experimental group with respect to the control group, not only individually for each student, but also for the group in general, improving the variables with group components such as the percentage of group participation, the percentage of the program executed and the greater realization of group consultation activities such as surveys carried out through the social network.

The improvement of these group dynamics and participation, also speaks of the potential of the social network to develop other types of skills in students that are not necessarily implicit in the subject programs but are necessary for academic and professional

performance. Such as argumentation skills, discussion, problem solving and even skills necessary for social interaction both at the level of educational institutions as well as work and personal.

On the other hand, taking into account the analysis of the survey made to teachers, where they refer that this model is more effective, it can be inferred that collaborative learning was not an exclusive process among students, but, on the contrary, teachers learned in the process of implementation by improving and encouraging interaction among teachers to reach strategies that eventually allow them to better carry out the learning and teaching processes, as stated by García et al. (2012).

Teachers find in Edmodo a social network that enhances their work, which allows them to be in permanent contact with all students even outside the university campus, making the teacher-student communication processes more assertive, and also making the teaching process more effective and enjoyable for teachers, in a friendlier environment where they can feel closer to the students.

Regarding both group and individual participation, it is observed that according to what is described in the literature by Chiang, Yang & Hwang, (2014), this model improves student participation in that it allows them to be better prepared to make contributions both in the classroom and in the social network, thus decreasing the intimidating environment of the face-to-face classroom as referred to by Henry (2012). Furthermore, this finding is consistent with the ability of social networks to form effective, friendly communication bridges and, therefore, with less tension among the actors involved in the educational process, as referred to in the literature by Cortés et al. (2015).

That the applied model and the Edmodo social network improve the dynamics of participation is a finding from which multiple benefits can be obtained for cases similar to the case study, since generally a lot of time can be spent in the classroom trying to motivate students to participate and even then, this effort can be in vain. Therefore, the model can be useful in improving the motivation and preparation of students to obtain a higher rate of participation and therefore generate a more fluid and beneficial knowledge management for all stakeholders, including higher education institutions.

In addition, a high adherence of students and teachers to the implemented model was observed. Students in general had a high level of satisfaction with the model, which leads to generate an improvement in motivation levels and gives students autonomy to manage their own learning process, which may be largely due to what Rowan-Kenyon et al (2016) referred to, in that higher education students have already had history with social networks,

i.e., they are not strangers to them, but on the contrary they have been growing with them and around them they have developed their social relationships by transferring several aspects of their lives to them. Therefore, it is not surprising that they do not offer much resistance to the use of social networks to carry out their learning processes, but on the contrary they see it as a beneficial and pleasant option.

However, it was observed that there was a very small resistance to the implementation of the model. This is totally natural, since it is an unknown process, however, in this case it may be due to the fact that as Alammary (2019) refers, as the activities through the social network are additional to the classroom activities, some students may take it as an overload of work and see it in a negative way, which can be accentuated by personal situations, such as lack of time due to other work or family commitments, or lack of motivation.

According to the findings for the students, in the case of the teachers, a high acceptance of the model was also observed, which is a key point in its implementation, since if the teacher does not feel interested or motivated to implement the model, its implementation can be incorrect, leading to negative results. It is important to highlight the role of the teacher in these processes, since it is the teacher who initially motivates the student to make use of the social network and who instructs him/her in the use of the social network, even acting as a problem manager. This is why it is mandatory for the success of the model to properly train and motivate the teaching staff for the implementation and management of the model that leads to satisfactory results and allows the use of the tools and potential advantages of the Edmodo social network.

Therefore, it is concluded that the knowledge management model applied was successful, since it was possible to demonstrate improved results in critical aspects with respect to the control group, mainly in the academic performance of students, their participation and the execution of the academic program over time, thus demonstrating the benefits of implementing these models and the use of educational social networks, in this case the Edmodo social network, both for students and teachers and even for educational institutions, which, if the model is applied on a massive scale, could see significant improvements in their quality indicators and the performance of their graduates and teachers.

The knowledge management model with the Edmodo social network was positively received by both students and teachers, generating an adequate level of motivation and satisfaction that allows continuous improvement and the development of the academic potential of students for a better development of the subjects.

On the other hand, it is evident that the applied model and the Edmodo social network present beneficial tools and characteristics for the development of subjects in systems and computing careers, in this case, particularly in introductory subjects of this career, which are important since they are the basis of contents and skills that should be developed later in the curricula of these disciplines.

The applied model and the Edmodo social network constitute an outstanding option to be applied in undergraduate subjects taken by students, youth and young adults of the three private higher education institutions in the city of Bogota, which are the object of the study.

For the case study, it is concluded that the applied model, which is a b-Learning model with the use of the Edmodo social network as a support to the face-to-face classes developed, is superior to the traditional model where only face-to-face classes are taken, since it presents better academic results, a better execution of the academic program for the assigned time, improves both group and individual participation, optimizes the communicative processes, presents a better distribution of time which leads to save time with respect to the traditional model and is also widely accepted and positively received by teachers and students.

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