Teaching Communication Strategies in Social Networks for Computer Science Students

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Abstract. Nowadays, web technology has changed drastically by positioning itself as an interactive, dynamic and very important in people's life, which is why it has become a fundamental tool in social media and communication. As professors of Computer Science (CS) students, we have seen the need to encourage the development of "soft" skills in the learning process of future engineers, such as communication, which represents a major challenge in the field of engineering. The purpose of our study was to introduce to university students of CS, how to incorporate communication techniques when using social media networks as an effective communication tool. The study aims to show that it is not enough to know the current social media networks, but rather requires targeted communication strategies for this type of media. In this way, it involved CS undergraduate students who participate in an optional course called "Strategies of communication and diffusion in computer projects" and another group that have the same level of curriculum in the same career, but they have not internalized in the techniques of communication oriented to social media. As mentioned above, the opinion of both groups and the perception of how they can use properly communication skills for their future work are presented, and indicating the need to incorporate this ability as part of the learning process in CS students.

Keywords: Social media · Communication strategies
Computer Science (CS) students
Information and Communication Technologies (ICT)

1 Introduction

The impact generated by new technologies and the globalized world has led entrepreneurs to demand professionals with comprehensive conditions regarding not only their profession but also basic conditions of human interaction and the general understanding of what is social media. Therefore, nowadays a professional besides having a specific knowledge in his area must also fulfill competences such as communication, feedback, interaction among others. Nowadays key competencies are the essential competencies for effective participation in the emerging patterns of work and work organizations. They focus on the capacity to apply knowledge and skills in an integrated way in to work situations [1].

Computer engineers are professionals who are at the forefront of what is today the impact of new technologies, but nowadays some students have more developed soft skills than others, so it is important for who don´t have those skills developed to offer during their studies the opportunity to learn new concepts and competences that will help to be integral professionals and that also generates a new attribute to their professional profile, "this implies a new conception of the engineer as an individual that surround a series of features not precisely of technological order, but rather committed to the search of problems solutions" [1]. Furthermore, understand users, know what they do, what they want, how and where; It is fundamental key for large companies, which is why it is a challenge for computer engineers to learn to understand individuals and how they use social networks. Whereby, we will begin to relate to basic concepts such as strategic communication, social media, computer science students (CS) and then relate them; and also make known how positive it is to have a professional with communication tools that make it an integral professional, for the global world in social media.

2   Using Communication Strategies in Social Media Interaction Trough Information and Communication Technologies (ICT)

Social media is fast, interactive, effective and inexpensive. Researches as Kaplan and Haenlein have given a perfect vision of how to perceive social media "what may be up-to-date today could have disappeared from virtual landscape tomorrow" [2]. Social media is not only the most efficient way to publicize a product or service, but it also helps users to understand any idea, product, to deliver a better service or create a new one, to give an opinion, etc. For this reason, social media is the most important thing in many agendas of business executives, or large companies that generate products or services. There are multiple applications where people can show themselves, make comments have an instant feedback or just look around for what they need. From the Facebook Boom applications have been appearing in addition to giving us more tools to get closer to everything or simply helps us to understand the global world; the way how we interact today is fast, simultaneous, just brilliant way! For this reason it is important to know how to use social networks effectively, and it is a fundamental complement for any type of company or microenterprise.

Today there are social needs that should be part of the training of today's world engineers. For this reason, the study plans must be designed based on the professional competences required by society. This is how each school must choose the competences that their graduates will possess at the end of their studies and design their curriculum based on these competences. These competences will define the professional profile of the graduates [3]. Authors such as Mayer [1] have classified competencies that are essential to be an integral professional, so he/she must:

- Collect, analyze and organize information
- Know how to communicate ideas and information
- Plan and organize activities
- Know how to work with others and as a team

- Use mathematical and technical ideas
- Solve problems
- Use technology

Within traditional education has always been learned to read and write, it has also been essential to learn mathematics as a capacity to analyze and reason for a solution to the problem, but when new technologies enter the world quickly is when begins to create a rethinking of how a professional should be trained, where in addition to learning the traditional must be impregnated with generic skills that help to respond flexibly and quickly to technological changes and their dynamism. Authors such as Huckin and Olsen have defined these skills as fundamental "… they are critical tools for success, even survival, in real world environments" [1]. Within these skills is the "communication" that is a fundamental tool to learn to communicate effectively.

There are studies carried out in scientific Universities and Schools of Engineering where it is demonstrated that communication is fundamental in the learning of engineers and that through this they generate other skills such as the ability to recognize and solve problems, then is when strategic communication is necessary as such. Therefore, developing communication skills should be an immediate objective in the academic and professional training of the students of this Century [1].

3 Strategic Communication Starts from the New Educational Paradigm Within Engineering

Globalization and technological changes have made traditional education systems begin to seek a change in the way courses and programs are taught and thus begin to develop in students skills and skills that will help them more effectively in the world of work. All this makes the new paradigm that shows the engineer as an integral professional who apart from learning specifically engineer skills must also have to learn to understand the real world in a practical, social, human way where there is a leadership and is able to face problems and to be able to solve them by interacting with others in an effective way and creating work groups [1]. This new paradigm is nothing more than a new vision of the profile of the engineer where new attributes and competences stand out, and we can state that this New comprehensive way to train professionals is a new educational culture.

"Man is immersed in his cultural context, from which he cannot isolate himself. Communication is, therefore, a permanent process that integrates multiple modes of behavior: words, gestures, looks, mimics, space management" [4].

The communication strategy is a series of programmed and planned actions that are implemented based on certain interests and needs, in a space of human interaction, in a wide variety of times. The strategy carries a principle of order, of selection, of intervention on an established situation [5].

Moreover, the communication strategy is the set of forms and modes of communication that aim to establish an effective communication of ideas, products or services with an implicit commitment of resources that help decision-making, and allow to achieve the organizational goals. However, the knowledge of communication strategies

does not imply understanding how to use effectively the available tools in a suitable way through the diversity of current technological applications [6, 7], show in a following Chart 1:
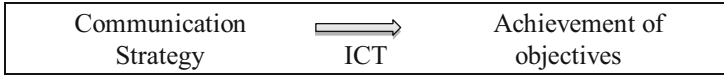
Communication Strategy	⟹ ICT	Achievement of objectives

Chart 1. Interrelation of study

Based on the information presented above, the study seeks to answer two main questions:

– Do computer engineering students know communication strategies through the use of ICT applications available for communication and dissemination?
– Do the study programs of the area under study, should consider a course with this subject within the career training plan?

4 The Experiment

For the development of this study, two groups of students of the same career and of the same level of curricular advancement within their curriculum are considered. One of the groups has also completed an optional subject within the mesh, called "Strategies of communication and diffusion of computer projects", which has as main objectives.

Teach students communication strategies applying effectively in social media. And use strategic communication and personal marketing as a new trend to change the prototypes that exist today in professional environments. This way, students will be able to develop their qualities of communication to the maximum, helping them to reach an optimal performance in the personal life and in the work world. In addition to this students will be capable of use communication effectively and related to their professional field. *The communication strategy shows how effective communication can:*

• Help achieve those global objectives of the organization.
• Participate effectively with interested parties.
• Demonstrate and exhibit the success of their work.
• Ensure that people understand what we do.
• Change the behavior and perceptions of users.

In this way a data collection instrument was designed, which would allow to compare both groups of students, in order to verify if the students belonging to a curricular plan associated with the ICT area, know how to properly use the social networks in the field of business-level communication. The groups that participated in the study correspond to 19 students who studied the aforementioned elective (*Experimental Group*), and 22 students who have not studied said subject (*Control Group*), remembering that both groups are from the same career or are in the same year of study.

The instrument used considered 10 questions, grouped into three categories: general, specific knowledge and application, which together allowed investigating the subject. The evaluation scale used considers:

- Likert Scale: A measurement tool allows measuring attitudes and knowing the degree of compliance of the respondent. In this sense, the response categories will serve to capture the intensity of the respondent to certain statements. For this case scale with 4° of compliance is used.
- Dichotomous questions: with yes/no answer (Boolean).
- Selection of Options: identification of possible alternatives for a certain evaluated aspect.

Table 1 presents the questions according to category, dimension and evaluation scale considered:

Table 1. General category questions

Dimension	Questions	Scale Type
D1. Appreciation	Q1. Do you consider that as a computer scientist learning effective communication techniques to be used in social networks is important within the career	Likert scale levels: SA. Strongly Agree A. Agree D. Disagree SD. Strongly Disagree
D2. Importance	Q2. As a future Engineer, do you consider that social networks are important in the process of communication in the workplace	Likert scale levels: SA. Strongly Agree A. Agree D. Disagree SD. Strongly Disagree
D3. Preference	Q3. What social networks do you use most often? The three most significant responses are considered in the results of this question	Options selection: D3.1 Twitter D3.2 Facebook D3.3 Instagram D3.4 Tumblr D3.5 LinkedIn D3.6 MSN D3.7 Snapchat D3.8 Otro
D4. Tendency	Q4. In the field of the use of information technologies, in the process of the delivery and dissemination of information, indicate that you are aware of the following communicational tendencies:	Options selection: D4.1 Blogs Corporativo D4.2 Chatbots D4.3 Publicidad native D4.4 Marketing in moviles D4.5 Newsletter

5   Results and Discussion

The main results of the instrument used in this study are shown below. It will be determined *"Experimental Group"* to those students who attended the elective and *"Control Group"* to those who do not (Tables 2 and 3).

Table 2. Specific knowledge category questions

Dimension	Questions	Scale Type
D5. Knowledge	Q5. You know the concept of "Strategic communication"	Yes/No
D6. Identification	Q6. In the area of social networks in the communication process, "Digital Strategy" corresponds to the application of techniques that are carried out in the offline world and translated into the online world	Yes/No
D7. Classification	Q7. For the following statements, point out: 1: if corresponds to Operational Objectives 2: if it is related to communication objectives All the options are valid as an answer	Options selection: D7.1 Train the staff effectively to work with our clients D7.2 Ensure that customers perceive how cleanliness is a primary objective within the organization D7.3 Ensure that all employees know and understand the expected customer service standards D7.4 Keep the facilities clean and well maintained
D8. Asociation	Q8. For the following aspects: Point out: 1: if it corresponds to Premises to be considered in the digital co-communication strategy 2: if it is related to tools as a dissemination tool:	Options selection: D8.1 Search engine positioning D8.2 Flow D8.3 Feedback D8.4 Microsites D8.5 Link campaigns D8.6 Loyalty D8.7 Massive email D8.8 Contextual advertising D8.9 Functionality

The analysis of the results will be carried out for each of the identified categories, and the dimensions evaluated in them, comparing both groups of the study (Table 4).

- General Category Questions

In the case of questions of a general nature, it can be seen that perception (associated with D1 y D2) of the students of *Experimental Group* it reaches a greater acceptance in both dimensions (52.6%, 57.9%), which shows that this group shows a greater appropriation to the importance of effective communication techniques in social

Table 3. Application category questions

Dimension	Questions	Scale Type
D9. Evaluation	Q7. If you had to inform a product or service of your company, identify what aspects you would have in mind to ensure that your message is received as it is pursued. Only the correct answers to the question are considered in the results	Options selection: D9.1 Target audiences D9.2 Keywords in message D9.3 Communication channels D9.4 Objective of the message D9.5 Business context
D10. Analysis	Q10. Which of the following types of study and/or analysis, would you use in the context of a project such as Electronic Voting in Chile? Only the correct answers to the question are considered in the results	Options selection: D10.1 The 4Ps (Product, Price, Place, Promotion) D10.2 5 Porter's five forces D10.3 SWOT (strengths, weaknesses, threats) D10.4 PEST (Political, Economic, Social, and Technological) D10.5 Competition analysis D10.6 CAME (Correct, Adapt, Maintain, Explore) D10.7 LRPD(Limitations, Risks, Potentialities, challenges)

Table 4. Percentage scores for dimensions (D1, D2)

	Dimension	(SA)	(A)	(D)	(SD)
Experimental group (19 participants)	D1	52.6	36.8	10.5	0
	D2	57.9	31.6	10.5	0
Control group (22 participants)	D1	47.8	34.8	17.4	0
	D2	34.8	47.8	17.4	0

networks as part of their future work performance, which is not possible to perceive in *Control Group* students, where relevance to what is considered in these dimensions they do not exceed 42% on average (Table 5).

Regarding the preferences of social networks and trends used, it is possible to appreciate that both groups maintain a high percentage for Facebook (D3.2) and assigns greater relevance to Mobile Marketing (D4.4), which responds to the wait-do,

Table 5. Percentage (D3) and average (D4) scores for dimensions

	D3. Preference			D4. Tendencies				
	D3.1	D3.2	D3.3	D4.1	D4.2	D4.3	D4.4	D4.5
Experimental group (19 participants)	21.1	**78. 9**	68.4	3.5	2.4	3.7	**4.6**	3.1
Control group (22 participants)	30.4	**87.0**	39.1	2.8	3.3	3.1	**4.3**	3.5

because it is about groups of students of the same career, of the same level of curricular advancement, and who are inherently inserted into the current information society, for them it is natural to live with virtual social networks and through mobile devices (Table 6).

Table 6. Percentage scores for dimensions (D5, D6, D7)

	Dimension	Yes	No	D7.1	D7.2	D7.3	D7.4
Experimental group (19 participants)	D5	57.9	42.1	**31.6**	**21.1**	**73. 7**	89.5
	D6	78.9	15.8				
Control group (22 participants)	D5	8.7	87.0	21.7	13.0	56.5	**95.7**
	D6	39.1	56.5				

- Specific Knowledge Category Questions

When reviewing the results of the dimensions associated with greater knowledge in the area of "Strategic Communication" and "Digital Strategies" (D5, D6) it is considerable to appreciate the lack of knowledge that the *Control Group* presents before the *Experimental Group*, where they average 23.9%, 68.4% respectively.

With respect to the classification of operational and communication objectives (D7) it is possible to appreciate that in 3 of 4 statements the *Experimental Group* overcomes the *Control Group* (Table 7).

Table 7. Percentage scores for dimension (D8)

	D8.1	D8.2.	D8.3	D8.4	D8.5	D8.6	D8.7	D8.8	D8.9
Experimental group (19 participants)	52.6	57.9	52.6	63.2	**73.7**	63.2	68.4	57.9	47.4
Control group (22 participants)	39.1	73.8	47.8	52.2	60.9	69.6	**73.9**	60.9	60.9

In the analysis of Association Dimension (D8), which looked for aspects related to whether it corresponds to Premises to be considered in the digital communication strategy and diffusion tool, it is observed that there is no clear relationship between both groups and that the statements: Link (D8.5) and Massive Email (D8.7), are the ones that obtain the best association in the *Experimental Group* and *Control Group* respectively, so it is not considered a relevant result in the study (Table 8).

- Application Category Questions

Table 8. Percentage scores for dimensions (D9, D10)

	D9.1	D9.3	D9.4	D10.1	D10.3	D10.4	D10.5
Experimental group (19 participants)	**100**	**89.5**	**57.9**	**73.7**	**100**	**26.3**	**36.8**
Control group (22 participants)	95.7	47.8	39.1	52.2	65.2	4.3	26.1

In the Evaluation Dimension, where the elements for reporting a product (D9) should be considered, the expected correct response corresponded to: Target audience (D9.1), Communication channels (D9.3) and Message objective (D9. 4). For the above, the *Experimental Group* presented a very good identification in the correct options, obtaining on average 82.5%, while the *Control Group* achieved a 60.8% assertiveness in this question. Respecting the ability to analyze the most appropriate studies for a particular case presented (D10), the correct options for this question were: 4P (D10.1), SWOT (D10.3), PEST (D10.4), Competition analysis (D10.5), for this case *Experimental Group* has in each of the correct options for this question a higher level of success than the *Control Group*. Although the *Experimental Group* had two very well evaluated options: "The 4P" (D10.1) and "SWOT" (D10.3) in conjunction obtained a 59.2% achievement, while the *Control Group* also obtained better results in (D10.1, D10.3) in total for this question only a 36.9% achievement, well below the *Experimental Group*.

6 Conclusions

Social networks are widely used today, in various areas of society, but this small sample made in computer science studentes makes it possible to demonstrate that it is not enough to know them, but that they need to be used in conjunction with communication strategies in order to enhance their effectiveness within the informative process.

For this study the dimensions (D1, D2) evaluated within the general category, results were obtained that show the relevance that the *Experimental Group* considers respect of the use of effective communication techniques in social networks, for a better professional performance. Regarding the preferences of social networks (D3) and trends for communication (D4), both groups agree on their results, which is within the expected, given that the groups of students have similar characteristics in their age range, and of studies achieved in the career.

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In the last category considered in this study, that of Application, the *Experimental Group* obtained significantly greater achievements before two practical situations consulted: elements to inform products and studies appropriate for a particular case (D9, D10).

With the results obtained in this sample, it is possible to conclude that the CS students need to study effective communication strategies that can be used through social networks. It is not enough to just be part of a career linked to information technology, but the current demands and changes in communication require knowing the most effective way to reach the target public, so it is left in question the need to consider this topic as compulsory element within the training plan of a career related to Computer Science, and not only as part of an optional subject, such as this study

account, which reveals the difference between both groups and what in the future may be considered a significant competitive advantage, considering an important soft skill such as communication.

As future work, it would be interesting to focus on those aspects that did not present a significant difference and that may require more detail for their study, as well as trying to measure the effectiveness of the communication process of a group that has knowledge of digital strategies.

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