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ORIGINAL

# The creation of educational content on physics in digital social networks: a challenge in professional training

# La generación de contendido educativo de física en las redes sociales digitales: un reto en la formación de profesionales

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**ABSTRACT**

Digital social networks are essential spaces for interaction in the lives of Internet users. When used in moderation, they can be a constructive tool for learners and students in training, although their potential as a complement to educational activities has not been widely explored. In view of this, this research presents the results of a study carried out at the Rubén Martínez Villena Teacher Training College in the province of Artemisa, which aims to analyze the use of digital social networks among students training to be secondary school teachers specializing in physics. The methodological basis of this study is mixed, quantitative, and qualitative, and consists of a survey applied to students and a series of interviews with students and teachers, with statistical work counting frequencies and percentages in the survey and interpreting meanings in the testimonies obtained in the interviews. The importance of the educational use of this type of network by students is highlighted, within the framework of collaborative learning.

**Keywords:** Social Networks; Training; Education; Teaching; Learning; Teacher.

**RESUMEN**

Las redes sociales digitales son espacios de interacción esenciales en la vida de los internautas, su empleo de manera moderada se convierte en una vía constructiva para los educandos y estudiantes en formación, donde sus posibilidades como complemento a la actividad educativa no han sido muy exploradas. Ante ello, en esta investigación se exponen los resultados de una investigación realizada en la Escuela Pedagógica "Rubén Martínez Villena" de la provincia de Artemisa; la cual tiene como objetivo analizar el empleo de las redes sociales digitales entre los estudiantes que se forman como docentes de Secundaria Básica, especialidad Física. La base metodológica de este estudio es mixta, cuantitativa y cualitativa, y consta de una encuesta aplicada a estudiantes y una serie de entrevistas a estudiantes y docentes, con un trabajo estadístico de conteo de frecuencias y porcentajes en la encuesta y de interpretación de significados en los testimonios obtenidos en las entrevistas. Se destaca la importancia del uso educativo de este tipo de redes por parte de los estudiantes, teniendo como marco el aprendizaje colaborativo.

**Palabras clave:** Redes Sociales; Formación; Educación; Enseñanza; Aprendizaje; Docente.

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## INTRODUCTION

In today's globalized world, information and communication technologies (ICT) play a fundamental role. International organizations such as the United Nations,[1] in its 2030 Agenda, ratifies among its objectives, number four (SDG 4): "Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all", which is of great importance for this research, since one of its goals is equity in the use of ICT.

Currently, the presence of ICTs is more strongly felt in their use, in their effective impact on process optimization, and in their power to connect and reduce distances between Internet users.[2,3,4] It is healthy to acknowledge the revolution brought about by ICT in many areas of human activity, both in the everyday family context and in organizations, but it is equally valid to recognize that the preferred spaces on the Internet are those dedicated to bland, sensationalist information and socializing, such as digital social networks. The question is how students behave in these areas and what meaning they give to their social and school life.[5,6,7]

ICTs have long been used for educational purposes, such as audiovisual teaching aids; at the same time, learning theories have recently focused on the student and collaborative learning as an area where the use of computers and cyber-navigation is considered useful.[8,9,10] The educational potential of digital social networks can be based on immediacy and network connections between students. In this situation, educational content could be addressed through online collaboration and comments, either in real time or at a later time. But does the mere connection between students improve learning? Probably not; however, digital social networks present some conditions that would favor it.[11,12,13]

This paper presents reflections based on research on the perceptions and use (educational, entertainment, or other) that students and teachers at the Rubén Martínez Villena Pedagogical School in Artemisa province have of digital social networks. The overall objective of this study is to analyze the use of digital social networks among students at the Pedagogical School, with the aim of proposing academic discussion groups in these spaces in the future. The specific objectives are: 1) to understand the perceptions of students and teachers about their experience in the use of digital social networks, and 2) to propose the creation of academic discussion groups, made up of students and teachers from the Pedagogical School, on digital social networks. For the fieldwork, a mixed methodology was applied, consisting of a survey and a series of interviews with students and teachers.

## DEVELOPMENT

Contemporary Cuban education, framed within the third stage of improvement and in line with the process of computerization of society, requires administrators and teachers in educational institutions to incorporate digital social networks to promote innovative models of teaching in schools.[14,15]

The impact of ICT on education is leading to one of the biggest changes in the educational field, allowing access to multiple resources, information, and communication, and establishing feedback between teachers, students, families, and other communities.[16,17]

In Cuba, the possibility of using digital social networks for educational purposes should be exploited to the fullest, especially by teachers. This enables them to exchange information with students, while also facilitating the opportunity to communicate with other colleagues, individuals, and family members to plan work projects and even work together.[18,19]

Teachers can create materials tailored to the needs of each student, based on the objectives of the program they are teaching.[20,21,22,23] Physics teachers in particular play a fundamental role in education, as this subject is a science that studies matter and also teaches critical thinking and a better understanding of the surrounding world. It also develops students' intellectual and practical skills, allows them to apply their knowledge in everyday life, and promotes the use of modern technology. In turn, it contributes to scientific literacy and adaptation to changes in education.

The creation of physics content on digital social media represents an innovative strategy for students to access this science. By taking advantage of the accessibility and reach of digital social networks, content creators can transform the learning of physics, a process traditionally considered complex, into an interactive and engaging experience. This content creation facilitates access to knowledge and allows for the building of global learning communities. By combining creative, accurate, and clear strategies, educators can transform the way physics is perceived and taught in the digital age.[24,25,26]

Various studies highlight the importance of using digital social networks for educational purposes.[27,28,29,30,31] From this perspective, and based on the proposals made by different authors, we can point out various possibilities that digital social networks offer for incorporation into training and educational institutions, for example:

1. They allow us to create a technological environment for multimedia communication, where different technological resources and learning objects such as video clips, audio podcasts, web addresses, multimedia materials, or connections to other networks can be located. This will allow participants to engage in a broad exchange of information in different types of media and symbolic systems, facilitating access to information according to their preferences, cognitive abilities, and multiple intelligences.[32]
2. These are highly motivating environments for students[33] facilitating their socialization.[34]
3. They constitute a multi-environment for communication, where students can communicate in a large group, in subgroups created by the teacher or by the students themselves to perform specific tasks, or in the students' own personal environments. These possibilities make it easier for teachers to create groups focused on specific learning tasks.[35]
4. They save teachers time and effort in the mass distribution and management of information.[36,37]
5. They are dynamic and interactive environments that promote the rapid exchange of information. In some of them, the number of characters that the subject can write is limited and, if the network structure allows it, all participants can become builders of collective meanings, thus promoting the development of collective intelligence.

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6. They allow teachers to obtain additional information about students by analyzing their profiles.[37]
7. They facilitate communication regardless of space and time, promoting the delocalization of knowledge, highlighting the virtual mobility of teachers and students to participate with actors other than those in their academic space. This favors the creation of multicultural scenarios[38], offering great opportunities for social and intellectual enrichment, but with regard to which there is a need for training to understand and respect each other's points of view.
8. They enable students to become significant actors in their own learning, allowing them to decide their level of participation and involvement in the network.
9. They allow for the review of participants' contributions and comments, promoting the review of the process followed for the construction of knowledge. This means that teachers must take on new roles, such as that of knowledge manager, who must facilitate the progress of the groups and the participation of all their members.
10. They are useful for generating and reviewing content.

At the same time, networks have a number of difficulties and limitations for their incorporation into teaching that must be taken into account for their implementation. Among these, the following should be noted:

1. One of the problems, especially in open networks, is assuming the risks of privacy and the use of elements of a person's digital identity.[39]
2. Another limitation is their use due to the novelty of the medium and the image that has been created around them, thinking that if adolescents already use them in their daily lives ( ), they should be directly incorporated into the classroom,[32] as it is a technology they have mastered and which only needs to be directly transferred to the educational environment. As is well known, the attitudes of ease that a medium can convey sometimes have a negative impact on its incorporation and educational use. We would point out that there is still not much experience and it is new territory. For Duffy[32], its use must be justified by teachers to students, so that they perceive that it is not a mere transfer, but rather an instructional creation.
3. Another problem that teachers may encounter is the lack of a culture of collaboration, which students sometimes display.[40,41]
4. It should not be forgotten that not everyone behaves in the same way on social networks, and that there are different types of users, ranging from those who participate and follow the educational process, to those who constantly seek attention, to those considered "bystanders" with minimal or no participation.[42,43] There are also those who show attitudes of rejection towards social media for different reasons: lack of confidence in the security of networks, lack of training and experience, or simply intellectual rejection of participation in networks because they perceive them as intellectually poor and a waste of time.[40,42]
5. Finally, reference could be made to the lack of training of students to participate in experiences of this type, and the tendency to deviate towards the recreational aspects of social networks, forgetting the educational purpose for which they were created or implemented by teachers.[27]

Taking into account the theories put forward by foreign authors, a survey was developed and administered to 33 subjects, 29 students training to be secondary school teachers specializing in physics and four teachers from the institution. A questionnaire was constructed with mostly closed-ended multiple-choice questions and open-ended questions to elicit more detailed responses. The interviews were conducted in pairs or groups of three students identified as being most willing to discuss the topic. A guide was designed for the semi-structured interviews, with the aim of making the discussions more flexible and improving the quality of the dialogue process.

The main results are summarized below: 81 % of respondents have a digital social media account, all on Facebook*;* among them, some have accounts on other digital social media platforms (Instagram and WhatsApp). 70,83 % use their account daily. 95,83 % are in contact with their classmates on these platforms; 75% exchange school information with them; and 50 % comment on or discuss academic topics. 54,16 % contact their teachers; 60,41 % exchange information with their teachers, although 58,33 % say that their teachers do not explain the subject matter on social media. Finally, 52,08 % consider the possible use of digital social networks for educational purposes to be an advantage, and 64,58 % would be willing to follow their courses through their digital social network accounts.

Regarding the open-ended questions in the questionnaire, the following generalities were presented: For what purpose do you use your page or profile on digital social networks? It is mainly used to keep in touch with friends and acquaintances, to communicate, to stay up to date, or to have fun: communicating, staying informed, viewing photos and videos, meeting new people, gossiping, leisure, passing time, wasting time, and socializing are some of the terms cited; and there was one mention of a work-related topic: *it is good for growing a business*.

Another open question was: "How long ago did you open your digital social media page or profile?" It can be said that the phenomenon of digital social media is recent among students at the Rubén Martínez Villena Teacher Training College, as the time since they opened their accounts ranges from less than a year to three years.

For the question: Why do you think it would be beneficial to exchange educational topics on digital social media?, the options Yes and No were offered, along with the reasons why. Those who leaned toward the affirmative response did so because of academic improvement: "questions would be answered," "classes would be discussed," "more time would be given to hand in assignments," "it is a powerful tool," "it is a tool where you can learn a lot as well as being a medium," or "it would improve learning." Those who disagreed (33,33 %) generally argued, for example: "it is better to attend classes in person; there is more opportunity to understand

and clarify doubts," "that's what school or other types of websites are for," "it's more for entertainment than educational purposes," or "it's a mediocre way of doing things."

What can be inferred from the responses obtained through the questionnaire is the frequent use of digital social networks among students with a list of contacts that includes close friends and classmates. However, there is still a certain distance from their teachers, whom students add to their list, but for formal academic purposes. Half of the students surveyed say they comment on and discuss school information on social media; we assume that there may be differences in the way they comment. The terms "tool" and "medium" assigned to digital social networks in the case of educational use stand out, but despite being a form of entertainment, some consider them a "mediocre medium." Thus, the distracting role of digital social networks as a place of recreation is noted, but according to the majority of students, they would be interesting as an educational aid.

The teacher's intervention is important, but at the same time disruptive, in a virtual context where academic discussion takes place. The interviewees agree that the platform and digital social networks are tools; they are different in terms of how they are used and the meanings assigned to them by their users, but they are not unrelated, they are interactive, among other similarities. Although there are reports of student disdain for institutional platforms in many schools (the case of the Rubén Martínez Villena Teacher Training College is no exception), the common ground between the two modalities is their mediation, which promotes good results and can provide feedback on their work on the platform. The information exchanged can be worked on, interpreted, and constructed through collaborative work.

Details can be appreciated and more profitable and less tedious dynamics can be configured on digital social networks; for example, through reduced teacher intervention in terms of presence (but not in terms of quality or undermining their role as mentors) that avoids putting pressure on students, stimulates their interest in co-authoring work with their classmates, and encourages group evaluation. The proposal here is for each member of the group to develop their interpretations of a topic; then, each of these explanations is circulated among the other classmates and receives complementary comments or corrections. These dynamics could also be adapted for students who already have discussion groups on their digital social network accounts. The challenge is to develop the academic possibilities of interactive Internet sites as an alternative to social interaction. This is where the importance of digital social networks lies in improving learning and increasing variety in teaching practices.[44,45,46]

## CONCLUSIONS

As indicated, digital social networks facilitate and enhance communication and interaction among participants, contributing to the collective construction of knowledge through active and collaborative learning processes. These processes can lead to the acquisition of high-level cognitive skills and strategies, as they involve the use of information retrieval, analysis, synthesis, discrimination, evaluation, message construction, and meta-evaluation skills, which are metacognitive strategies. However, for this to be possible, teachers must consider why they want to implement networks as a teaching resource, i.e., what objectives they aim to achieve. They must select the most appropriate network for their students' profile and in line with the objectives set, and they must be convinced of its pedagogical usefulness beyond the technological fads that often invade classrooms without prior reflection, and show a clear commitment to participation and advice to participants. Students must commit to using the network for educational purposes, rather than for fun or on a whim, which requires commitment and the acquisition of technological and social skills to successfully participate. The use of digital social networks in the training of physics teachers is an important element, since digital social networks, as a digital ICT resource, cut across all categories of the teaching-learning process, thus revitalizing teaching in general and physics teaching in particular.

## CONFLICT OF INTEREST

None.

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## AUTHORSHIP CONTRIBUTION

*Conceptualization:* Andry Gonzalez Pacheco.
*Research:* Andry Gonzalez Pacheco.
*Writing – initial draft:* Andry Gonzalez Pacheco.
*Writing – revision and editing:* Andry Gonzalez Pacheco.

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