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Impact of science and innovation to improve the teaching-learning process

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Abstract

When we talk about science and innovation, it is to refer to the main support of human activity, to transform the objective reality of the teaching contexts, the theoretical and empirical methods, allow us the logical reasoning of the processes and phenomena, to give answers to possible hypotheses, and make decisions and advance in thinking, cultural, artistic, social, and educational, as the basis of analytical, reflective and holistic instruction, according to its impact on the educational field. This study aims to know the impact that science and innovation have had on students of Physical Culture to improve the teaching-learning process. To do this, the research starts from a qualitative approach, based on a descriptive and longitudinal study. Different methods and instruments were used, such as the documentary review, the questionnaire, the survey, and the triangulation. In addition, the criterion of inclusion and exclusion. The most relevant findings contribute to linking the components (objectives, contents, and methods) with science and innovation to improve the teaching-learning process. In conclusion, pedagogical interventions provide solutions to teaching work as a significant means for teaching science and innovation.

Keywords: science; innovation; teaching-learning process

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Introduction

In these two decades of the XXI century, the world has changed in a vertiginous way, where teachers and students have sought new ways to adapt to social and educational problems, it is feasible to address, from an academic perspective, to deepen the study of science and innovation, as necessary tools to improve the teaching-learning process in higher education.

On the other hand, science and innovation seek the truth about the epistemological, ontological, axiological, and methodological categories, this link allows teachers and students to propose more significant and valuable results in the field of education and obtain much more holistic knowledge for their professional training.

It is significant to emphasize the transcendence of the impact of science, as a necessary steppingstone for the different economic, social, and educational formations in the different areas of knowledge, of course, Physical Culture does not escape such an assertion.

About works of literature consulted sources, the authors have expressed the importance of this variable in their studies, concerning science, among them we can highlight (Albert, 2007; Garcia, 2008; Fernandez et al., 2011; Fraschini, and Silveira, 2015; Cruz et al., 2016; Bunge, 2017; Silva et al., 2021), propose that science is the organized, systematic expression, related to the processes of production and application of knowledge, planned and structured, based on theoretical and practical methods.

On the other hand, science and innovation, allows us to make decisions to accept or reject scientific theories, based on theoretical and empirical methods for acceptance, the latter are determining aspects with the practice of professional training of students of Physical Culture such as observation, experiment, measurement, survey, questionnaire, interview, which are conceived as relevant methods, where science is based to recommend models of changes in paradigms and approaches, from different perspectives to improve the teaching-learning process. The intention is to address the impact of the object of study in question.

According to, the inquiries made by researchers such as (Sierra Bravo, 1988; Ezpeleta, 2004; Martine & Dimitris, 2004; Lopez, 2010; Asencio, 2012; Muños et al., 2013; Fiksl et al., 2017; Serdyukov, 2017; Hicks & Irizarry, 2018; Montoya and Cogollo Ospina, 2018; Kalyani, & Rajasekaran, 2018, Alava & Moya, 2019; de la Rosa et al., 2019), science and innovation, are essential tools to advance in development, conduct in an orderly and methodical manner the actions to describe the effective forms, about the subjects and disciplines, and provide a power of new theories towards an impact on the improvement of the teaching-learning process.

On the other hand, science, and innovation to improve the teaching-learning process is a relevant path of scientific reflection and constant criticism to efficiently solve the development of the mission of education (Ortiz, 2015).

Likewise, science and innovation have led modern societies to live scientific advances that cover all unthinkable areas, from medicine, agriculture, nuclear energy, technological advances, this is where we need to intervene, seek, and suggest new knowledge for reflection to make the educational context more dynamic and divergent, from Physical Culture.

Innovation

From the new changes that are taking place in the social context, teachers must contribute to a continuous improvement of their educational practices, so that they correspond to science and innovation, to be attractive to students.

On the other hand, when talking about science and innovation, it implies proposing and improving the teaching-learning process, and these relate to the search for viable solutions with research.

In this regard, different authors emphasize, in these assertions, such as (Pierre & Pollan, 1979; Restrepo, 2003; Sánchez, 2005; Ersoya & Başer, 2014; Marks, 2015; Tierney & Lanford, 2016; Gonzalez and Gonzalez, 2017; Fayomi et al., 2017; Saorin et al., 2017; Guardia et al., 2019; Perez et al., 2020; Singh, & Atwal, 2020), intentionality is to improve the teaching-learning process; through the impact of science and innovation related to the most attractive teaching methods to raise awareness among students in their performance, based on proper planning, organization of ICTs.

In other words, science and innovation can be defined as a set of tools necessary for educational and social development, nationally and internationally, in search of better solutions for the well-being of school management and the quality of teacher performance effectively to successfully achieve the teaching-learning process, where science and innovation play a fundamental role in the cognitive and socio-affective and emotional magnitudes for the creation and continuous improvement of students (Guerra et al., 2014).

In other words, science and innovation allow teachers and students to make decisions, with a high probability as protagonists of educational practice, about the objectives, contents, and methods of the teaching-learning process (Carbonell, 2001).

In this regard, in the field of education where there are multiple opportunities to develop science and innovation, teachers must take advantage of opportunities to teach more dynamic classes, which break traditionalist schemes, starting from the didactic intervention, in correspondence with the experiences in a particular way, to improve the teaching-learning process.

From another approach, teachers and students must investigate the objective components, contents, and methods to discover different perspectives to create something relevant, and these allow to implement of a better teaching-learning process, through science and innovation (Margalef and Arenas, 2006).

In addition, science and innovation must make it possible to diagnose and evaluate problems, according to the needs of educational practices, to guarantee a quality teaching-learning process; In addition to proposing more associative practices, through the correct use of strategies focused on students, according to their needs to carry out more solid actions for the well-being of human beings and the quality of education (Canizales et al., 2020).

It is important to emphasize that science and innovation must start from a correct didactic training planning by teachers, by the precepts and premises of direction of the objective components, contents, and methods, about the needs of students, to awaken in these, the curiosity to investigate and recommend more questionable results for social and educational problems, by previous knowledge, under the correct pedagogical leadership of teachers.

In this sense, through science and innovation, the paths of the teaching-learning process must modify certain educational needs, to form more integral students for more complex processes, such as (knowing how to coexist, knowing how to do, knowing how to share).

Teaching-learning process

Social changes have brought with them the need to redesign education in our country, although this sector is still lagging in such important changes, especially in its guiding documents such as traditionalist curricula and programs, for the progress of the teaching-learning process, linking science and innovation, as an indispensable theoretical support.

I agree with the works of the literature analyzed on the teaching-learning process (Popeelina, 1988; Briscoe, 1991; Mellado, 1996; Longhi, et al., 2004; Watkinson, 2006; Carolyn, & Leighton, 2010; Carless, 2013; Murphy et al., 2013; Arteaga et al., 2016; Benitez, 2016; Abreu et al., 2017; Kahn and Agnew, 2017; Marini, 2017; Mahmood, et al., 2018; Macedo et al., 2018; Marini et al., 2019; Darling et al., 2020; Ramos et al., 2020), the teaching-learning process must be dynamic, holistic; In addition to these, teachers must be transformative to develop skills, abilities, and attitudes in students, with solid theoretical and practical foundations, based on methods, such as analysis-synthesis, inductive-deductive, modeling, systemic and historical-logical and reflective to improve the teaching-learning process.

Science and innovation have tried to influence in a solid way the attitudes of students, to incorporate and mobilize; through educational research to develop knowledge, skills, values, and competencies. The Organization for Economic Co-operation and Development states that teachers must impose too many changes, without being consulted, in advance to successfully implement the changes, which are necessary and emerging (OECD, 2016, p.12).

Consequently, didactics is the discipline that makes up the teaching act of transmitting teaching, in an accessible and affordable way, so that students learn, understand, and address the most pressing problems of the teaching-learning process, according to structural categories and even from a peculiar disciplinary training before the constitution of education and pedagogy. (Diaz, 1998).

We could summarize those scientific advances derived from research and innovation improve the teaching-learning process, these may be related to changes in objectives, contents, methods, these components generate an impact on students, especially in the cognitive, affective, and emotional dimensions (Macanchi et al., 2020).

From the position, silver above, the objective of this study is to know the impact of science and innovation to improve the teaching-learning process.

Materials and Methods

About everything affirmed the research starts from a qualitative approach, sustained under a descriptive, longitudinal study. For this purpose, we used different instruments such as review of documents exposed invalidated databases; these qualitative methods allowed us to analyze and synthesize the valuable information to deepen the study; in addition to the instruments questionnaire, Survey, and triangulation, according to the answers provided by the students (Gonçalves et al., 2017).

Participants

The participating subjects are the 31 students of the Bachelor of Physical Culture eighth semester of the 2021-1 school year. Made up of 14 women and 17 men.

Instruments

Documentary Review, sources were consulted, with databases in articles published in the last 10 years. These made it easier for us to deepen the impact of science and innovation to improve the teaching-learning process.

A questionnaire was used to know the arguments related to the impact of science and innovation during the teaching-learning process. This instrument was composed of five items, made up of dichotomous questions. As a result of the results found, these were resolved using the percentage calculation.

A survey has the purpose of corroborating the verification through a frequency table of the answers provided by the students, this contains 10 multiple choice questions: Always, S (4); Often, O [3]; Sometimes, AV [2]; Never, N [1].

Triangulation made it easier for us to contrast and synthesize the results derived from the instruments applied, according to the information provided; in addition to interpreting and validating coherently in the social sciences (Ruiz, 2005).

Inclusion Criterion, this allowed us the informed consent of the students, who wished to participate voluntarily, during the research process, this allowed us the confidence of the participants. Data protection is safeguarded for academic and research purposes, based on ethics.

Exclusion Criteria, we intentionally exclude teachers so as not to manipulate the results.

Procedures

In advance, we met in three moments with the participants to specify and detail the procedures related to the application of the instruments. In addition, these were provided to the participants, via institutional emails to be answered, due to the confinement. Several previous meetings were held with the participants to establish a relationship of affective cordiality.

The first three Wednesdays correspond to February 2021, from 17: 00 to 18: 00 hours, in the 2021-1 school year. These meetings were run virtually, through Microsoft TEAMS.

About the period spent, the details of the methodological procedures were explained to the students, related to the correct application of the instruments. The forms were prepared with the specialized software program LimeSurvey, these were provided via institutional email, due to the confinement.

Results and Discussion

Regarding the results of the instruments applied to the participating subjects, according to the answers provided, on the impact of science and innovation to improve the teaching-learning process. Of the 31 eighth-semester students of the bachelor's degree in Physical Culture, composed of 14 women represented [45.16%], and 17 men for [54.84%].

According to the results related to the questionnaire applied to the 31 students. Of these [54.84%], they endorsed that teachers explain and emphasize the objectives of their classes, these link them with science and innovation in the form of problems.

Regarding question number two [51.62%], they pointed out that teachers in their classes relate the importance of science and innovation to improve the teaching-learning process.

According to, item three [58.06%], stated that during the teaching-learning process teachers give great relevance to the objective components, contents, methods, these link them with science and innovation to improve praxis.

In question four of the questionnaire [67.74%], they expressed that teachers during the development of the teaching-learning process, stimulate and generate in students, a vision in seeking solutions to problems in science and innovation.

Finally, we were able to record that [74.19 %], stated that teachers use Information and Communication Technology, to improve the teaching-learning process. Refer to Table 1.

Table 1 Results of the questionnaire

No	Items	Answers			
		Yes	%	No	%
1	Teachers explain and emphasize the objectives of their classes, these link them with science and innovation in the form of problems.	17	54.84	14	45.16
2	The teachers in their classes relate the importance of science and innovation to improve the teaching-learning process.	16	51.61	15	48.39
3	During the teaching-learning process, teachers give great relevance to the objective components, contents, methods, these link them with science and innovation to improve praxis.	18	58.06	13	41.94
4	teachers during the development of the teaching-learning process, stimulate and generate in students, a vision in seeking solutions to problems in science and innovation.	21	67.74	10	32.26
5	Teachers use Information and Communication Technology, to improve the teaching-learning process.	23	74.19	8	25.81

Concerning the results found, according to the survey applied to the 31 students, they explained that teachers always or/and almost always, use science and innovation. This must be by the new paradigms of science and innovation to solve global problems in the educational field, therefore, teachers planning the objective components, contents, and methods, must be linked to ICTs, at least. Check-in Table 2.

The impact of science and innovation must be in an organized way, with the correct use of methods to assertively tax actions and objectives, according to the needs of the teaching-learning process.

It is often said that "the only constant is change", that the only way for organizations to progress and contribute to solving the problems of the modern era of ICTs (Tierney & Lanford, 2016, cited in Sanchez et al., 2018, p 23).

Table 2 Survey results

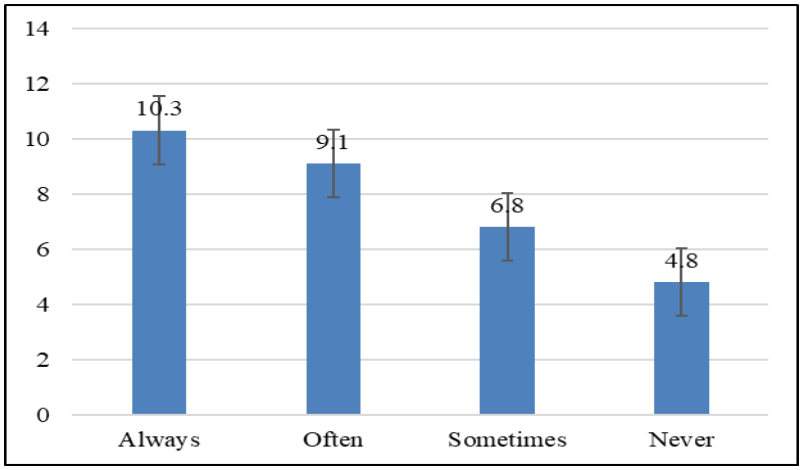
No	Items	S [4]	%	O [3]	%	ST [2]	%	N [1]	%
1	Do you consider what teachers guide and emphasize science and innovation in their classes?	12	38.71	9	29.03	7	22.58	3	9.68
2	How do students express their criteria, if teachers relate the objectives, contents, and methods with science and innovation for their professional training?	11	35.48	11	35.48	6	19.35	3	9.68
3	Do you consider as a student, if teachers use science and innovation according to the teaching-learning process?	10	32.26	10	32.26	6	19.35	5	16.13
4	Do you consider as a student that to improve the teaching-learning process, science and innovation are essential links?	9	29.03	9	29.03	8	25.81	5	16.13
5	Do you consider as a student, if teachers are promoters of science and innovation to improve the teaching-learning process?	9	29.03	9	29.03	7	22.58	6	19.35
6	From your student perspective, do you consider that teachers develop scientific and innovative thinking to improve the teaching-learning process?	10	32.26	8	25.81	6	19.35	7	22.58
7	What importance do you attach to projects based on science and innovation for the development and generalization of the teaching-learning process?	11	35.48	9	29.03	6	19.35	5	16.13
8	Do you think that teachers' plans correctly tax the use of scientific methods to transform the teaching-learning process according to the cognitive development of students?	11	35.48	7	22.58	7	22.58	6	19.35
9	In your opinion, which of these objective components, contents, methods of the teaching-learning process are most related to science and innovation?	10	32.26	11	35.48	7	22.58	3	9.68
10	Do you think that teachers promote scientific and innovative culture to improve the teaching-learning process?	10	32.26	8	25.81	8	25.81	5	16.13

According to the most relevant results, 31 students surveyed, the degree of variation about the average values of the items, [10.3], expressed those teachers always guide and emphasize science and innovation. Because of the values detected in [9.1], they pointed out that teachers do associate the objectives, contents, and methods with science and innovation for their professional training.

According to the answers argued by the researchers [6.8], they provided that sometimes, teachers during their classes do not provide all the necessary elements, about the

impact of science and innovation. Finally, [4.8], of the respondents allude those teachers never link science and innovation in their classes. See Figure 1.

Figure 1 Statistical results of the survey



The intention of this study is directed to know the impact of science and innovation to improve the teaching-learning process in students of Physical Culture. It is interesting to note that science and innovation are essential regularities that govern the teaching-learning process, this allows teachers to scientifically direct the integral development of students (Martínez, 2013)

During the teaching-learning process, teachers must be more emphatic, of the importance of scientific and innovative culture in making decisions the accepted ways to advance in the historical and cultural thought of the XXI century, due to technological advances, it must be the focus of attention on the part of teachers, they must be more emphatic in changing the attitude of the agents that intervene in the university complex for the development of science and the innovation of the teaching-learning process so that there is a cognitive impact by teachers and students (González and González, 2017).

This set of new challenges configures a new scenario conducive to innovation and the development of new initiatives by teachers" (Oviedo, 2012, p.14).

According to the answer offered by the students [35.48], teachers always attach importance to projects based on science and innovation for the development and generalization of the teaching-learning process. These include approximate data in the Guerrero research (2017), "concerning the typology of the projects this year, 46.26% of the projects are in the line of "Support for Open Education (AEA) increasing compared to the previous year whose percentage was 38%". (p.20).

We agree with Chirino (2012) when he states that:

The teaching-learning method of educational research must contribute to the appropriation of the scientific method, which becomes the content of this process, as evidence of a model for action. The method in didactics is seen as the system of actions of the teacher and the student to achieve the objectives of the teaching-learning process (p.21).

It would be convenient for teachers to develop scientific and innovative thinking to improve the teaching-learning process as an essential means to transmit science and innovation.

In this regard, pedagogical intervention is the intentional action that develops in the educational task to comply with the structural categories of didactics such as objectives, contents, methods, forms, didactic strategies didactic means, evaluation to justify the

foundations of knowledge, according to the operation pedagogical intervention to improve didactics through science and innovation (Touriñan, 2011).

Such broad issues tend to dimension the role of statements that have to do with the "duty to be" effective, efficient, and effective teacher within the classroom in search of the desired educational quality; in this sense, teachers may lack resources of science as a paradigm of knowledge and innovator and leave behind traditional and reproductive teaching, where science and innovation for pedagogical intervention, contribute to develop a dynamic process and provide the quality of teaching.

It is important to analyze the relationship between science and innovation, as the role attributed to didactic activities within the innovative process to improve didactics in pedagogical intervention, for many innovators is to invent something new for us to improve, propose, solutions a favors designing a relationship with the theoretical and empirical methods of educational science, propose new didactic resources involving individually and in groups students so that they manifest their perspectives of analysis, reflection, may or may not be innovation, (Barraza, 2005, p.21).

For this reason, teachers and educational authorities must pay attention to the impact of science and innovation to redirect the teaching-learning process to raise educational quality.

Conclusion

By way of conclusion, we can affirm that the Impact of science and innovation to improve the teaching-learning process, being a way that teachers must propose new ways to promote in students a change of a culture of knowledge, pedagogical interventions provide solutions for teaching work as a significant means by the objective components, contents, and methods.

Science and innovation express those studies have changed in the education sector, not only because of social events but also because of the accumulation of information generated by ICTs, educational praxis, and its applicability, in students of Physical Culture so as not to be left behind.

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