

Article

Expectations and Interests of University Students in COVID-19 Times about Sustainable Development Goals: Evidence from Colombia, Ecuador, Mexico, and Peru

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Citation: Alvarez-Risco, A.; Del-Aguila-Arcentales, S.; Rosen, M.A.; García-Ibarra, V.; Maycotte-Felkel, S.; Martínez-Toro, G.M. Expectations and Interests of University Students in COVID-19 Times about Sustainable Development Goals: Evidence from Colombia, Ecuador, Mexico, and Peru. *Sustainability* **2021**, *13*, 3306. <https://doi.org/10.3390/su13063306>

Academic Editor: Gisela Cebrián

Received: 3 February 2021

Accepted: 15 March 2021

Published: 17 March 2021

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Abstract: The coronavirus disease 2019 (COVID-19) pandemic has changed the world, creating the need for new actions from society, including universities and companies. The United Nations Sustainable Development Goals (SDGs) are part of a global agenda, but this priority is not significant to university students. Although some research has focused on SDGs and university students, there is a lack of evaluation and comparison in Latin American countries. The current study aims to evaluate student knowledge of the SDGs, the relation of student professional careers to the SDGs, the importance of the SDGs for economic development after the COVID-19 pandemic, and student interest research in SDG issues. The study is carried out with students in Colombia, Ecuador, Mexico, and Peru. The instrument was developed and validated. The highest score of level of knowledge was reported in Mexico and the lowest score in Colombia. This outcome can be explained by the availability of training programs in the universities about SDGs. The availability of programs created and promoted by the governments can also be a reason; however, students from Mexico are the ones who felt the most that the authorities are not making efforts to promote the SDGs. With research interests, interests in creating sustainable cities and communities, and responsible consumption and production were recognized for the four countries. The outcomes reveal several interesting insights through comparisons among the four countries considered according to descriptive analyses. Some SDGs were found to be more important for some countries than others. Interests were noted in research on some SDGs.

Keywords: sustainable development goals; university; sustainability; sustainability education; COVID-19; Colombia; Ecuador; Mexico; Peru

1. Introduction

The Sustainable Development Goals (SDGs) were created as a call for action by all countries—developed and developing—in a global partnership. The 2019 SDG report shows the great urgency of the efforts of SDGs (UN, 2019) [1]:

- Fifty-five percent of the world’s population has no access to social protection.
- Two-thirds of extremely poor employed workers worldwide are agricultural workers.

- The tuberculosis incidence rate declined by 21% between 2000 and 2017; nonetheless, 10 million people developed tuberculosis in 2017.
- A total of 750 million adults remain illiterate. Two-thirds of them are women.
- A total of 785 million people remain without even essential drinking water services.
- A total of 3 billion people lack clean cooking fuels and technology.
- One-fifth of young people are not in education, employment, or training.

All United Nations Member States adopted the SDGs in 2015 for the 2015–2030 period. In this global proposal, 17 goals were established that focused on addressing a serious and constant problem: hungry, poverty, education, and health, at individual and society levels. The SDGs were proposed considering specific goals for each goal to develop actions focused on mitigating [2] and generating resilience against climate change [3] as advocated by Goodland and Daly [4], reducing inequities [5], promoting economic development with environmentally friendly technologies [6], taking care of the air [7], and preserving the oceans [8] and forests [9].

The SDGs encourage governments and firms to develop visions, missions, and operational plans with sustainability content for the generation of fair work [10] and global collaborative alliances [11]. The SDGs are not only an environmentally focused set of goals, as many think, but rather a multidimensional approach to sustainable development to achieve the well-being of people [12]. This approach has been accepted and endorsed at the governmental level in most UN countries, but its practical execution in a given country requires efforts related to companies' economic-commercial activities and people's conduct. The SDGs have been increasingly embraced by various countries and institutions worldwide [13]. For example, in tourism, there are various efforts aligned with the SDGs [14,15], including recognizing tourist areas of interest [4]; other efforts to implement the SDGs can be seen in sports [16], building [17], transport [18], waste management [19], water management [20], food [21–23], health [24,25], and supply chain management [26–29].

When the SDG implementation strategies were proposed in 2015, it was suggested that the main element should be education for sustainable development, which had already been established at the United Nations Conference on Sustainable Development—RIO + 20 (UN, 2012) [30]. It has been recognized that citizens' formal education must have components that can guide the understanding of the SDGs and their implementation in their daily lives [31]. Various higher education institutions signed the commitment to sustainability practices in higher education institutions, which recognizes higher education institutions' responsibility to develop a country. After that document, efforts have been made in education for sustainable development [32,33].

It is relevant to know the students' perspectives about SDGs and the importance of carrying out studies about it. The students' knowledge and research expectations regarding the SDGs in Latin American countries have not been examined in detail. Therefore, the current study's objective is to evaluate the SDGs' perceptions by engineering and international business students from Colombia, Ecuador, Mexico, and Peru.

We have obtained information from these four countries through virtual surveys, which indicate the knowledge, expectations, and interests of the participants. This information is valuable as scientific knowledge and at the same time helps governments and universities make decisions to strengthen theoretical teaching and practice regarding the SDGs.

The remainder of the paper is structured as follows: Section 1 present the introduction of the article. Section 2 presents the background, including different definitions and concepts about SDGs and education. The methodology, including a description of the instrument, sample, and data process, is presented in Section 3. Section 4 presents the results of the study according to the questionnaire applied. Section 5 presents a discussion on the topic and findings. Conclusions with theoretical, practical, and societal implications and future research recommendations are provided in Section 6.

2. Literature Review

In 2012, the United Nations Rio + 20 summit in Brazil [30] committed governments to create a set of Sustainable Development Goals (SDGs) that would be integrated into the follow-up to the Millennium Development Goals (MDGs) after their 2015 expiry. Considering the projected growth of the world population to 9 billion by 2050, it was established that the SDGs focus on various issues of life on the planet: addressing poverty and hunger, reducing environmental pollution, creating equalities between people, protecting the health of the people, and enhancing sustainable social/business development.

The annual SDG Index supplies a standard and a scalable composite measure of SDG baselines for 149 countries [1]. The SDG index data lead to main findings:

1. High-level political commitment to the SDGs is falling short of historic promises:

77% (33 of 43) of countries surveyed on SDG implementation efforts have endorsed the SDGs in official documents since 2018; however, only 18 claimed that their central budget documents mentioned the SDGs.

2. The SDGs can be operationalized through six SDG transformations:

- a. education, gender, and inequality
- b. health, wellbeing, and demography
- c. energy decarbonization and sustainable industry
- d. sustainable food, land, water, oceans
- e. sustainable cities and communities
- f. digital revolution for sustainable development

3. Sustainable land-use and healthy diets require integrated agriculture, climate, and health policy interventions:

One-third of food is wasted, 800 million people remain undernourished, 2 billion are deficient in micronutrients, and obesity is rising.

4. Trends on climate (SDG 13) and biodiversity (SDG 14 and SDG 15) are alarming:

The Intergovernmental Panel on Climate Change (IPCC, 2019) [34] and the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES, 2018) [35] mentioned that countries had not achieved relevant results in SDG 13, SDG 14, and SDG 15 despite the efforts appearing to be effective.

The coronavirus disease 2019 (COVID-19) pandemic has changed the world in many ways and has prioritized essential elements of people's lives, including health and education. In this context, the SDGs, after focusing on the reduction of poverty (SDG 1) and hunger (SDG 2), highlight tasks focused on improving health (SDG 3) and education (SDG 4). In many regions during 2020, the low level of education and health have made it challenging to manage the pandemic. The physical and mental health of people and health professionals have been affected [36–41], while the low literacy regarding health matters in many countries explains the overabundance of information both online and offline (sometimes referred to as an infodemic) generated by the population at a global level [42–44].

Education as an SDG is, perhaps more than ever, a priority to ensure that students can develop appropriate and rapid responses based on inputs to the SDGs. During the Rio + 20 meeting [30], universities committed themselves concerning education to:

- a. Teach the concepts of sustainable development.
- b. Promote research on sustainable development issues.
- c. Transform the campuses towards sustainability.
- d. Support efforts for sustainability in the community to which they belonged.
- e. Engage and share the results with international frameworks.

The Sustainable Development Goals Fund [45] recognizes that universities play a crucial role in fulfilling the SDGs towards the year 2030; this role is associated with increasing human capital with a perspective based on the SDGs.

Numerous studies on the SDGs in education have been reported. In this way, Silo and Kethloilwe [46] described the importance of focusing on the SDGs for education to disseminate awareness of the SDGs in a general way. Aleixo et al. [47] evaluated the level of implementation of the SDGs in higher education in Portugal and showed that at least 198 courses had SDG components and that Master's programs have more SDG components than undergraduate programs. Efforts have been described in Mexico by Ramirez-Mendoza et al. [48] for implementing the SDGs in the context of an engineering career. Similar work was carried out by Argento et al. [49] in Sweden using a transdisciplinary approach, where student courses covering the SDGs are highlighted. Sachs et al. [13] have grouped the SDGs to propose six significant transformations, the first transformation being education, gender, and equality. From another perspective, it is relevant to follow the efforts of Kopnina [50] to ensure that SDG education generates the impact that, in theory, is expected, and the work in Nigeria [51] details the contributions of students and professors of business schools to educate the population about banking systems.

A review of the literature suggests that efforts of students to ensure that their education has cross-cutting components of the SDGs have been recently evaluated by researchers in many countries, such as Brugmann et al. [52] in Canada, Peña Miguel et al. [53] in Spain, Manolis and Manoli [54] in Greece, Yang and Maresova [55] in China, Alsaati et al. [56] in Saudi Arabia, and Priyadarshini and Abhilash [57] in India. Of further relevance is the questioning of current teaching by Pallant et al. [58]. Finally, an essential aspect that Cottafava et al. [59] describe is the need to generate active engagement of students that leads to a transformative learning experience in order to achieve real learning of the SDGs.

Many institutions have developed various resources to support the SDGs, and many of these relate to education. These include UNESCO resources to promote education for the SDGs, e.g., the Education for Sustainable Development Goals Learning Objectives (UNESCO) [60] in which various competencies were identified to be developed in the framework of education for the SDGs:

- a. Systems thinking competency
- b. Anticipatory competency
- c. Normative competency
- d. Strategic competency
- e. Collaboration competency
- f. Critical thinking competency
- g. Self-awareness competency
- h. Integrated problem-solving competency

The UNESCO document provides examples of learning approaches and methods for each SDG that can guide students in the context of the SDGs in an enjoyable and application-based manner.

Research on the SDGs is in its early stages, with few studies from universities about SDGs and students, although some examples are starting to appear at the university level. For example, Castillo-Villar [61] from Mexico developed a quantitative method to contribute to the measurement of SDG 17 (Partnerships for the Goals). At the same time, Wamsler and Restoy [62] showed that emotional intelligence is a key to achieving peaceful, just, and inclusive societies SDG 16 (Peace, Justice, and Strong Institutions). Brandli et al. [63] evaluated the contributions of university green areas to SDG 4 (Quality Education) and SDG 15 (Gender Equality).

Likewise, there have been efforts from the United Arab Emirates regarding SDG 14 (Life Below Water) [64], while Franco et al. [65] examined the need for efforts to combat climate change under SDG 13 (Climate Action). Gasper et al. [66] investigated an approach to sustainable consumption, supporting SDG 12 (Responsible Consumption and Production). Many people view SDG as one of the pillars proposed for the global reactivation post-COVID-19.

Regarding participation in SDG 11 (Sustainable Cities and Communities), broader approaches have been developed from the perspectives of the circular economy [67] and the

construction of sustainable cities [68–71]. For SDG 10 (Reducing Inequality), Hossen and Khondker [72] show progress in India to reduce equality. There is a significant experience in sustainable innovation at a university campus in Spain with SDG 9 (Industry, Innovation, and Infrastructure) [73]. Regarding SDG 8 (Decent Work and Economic Growth), Novitz [74] examined how the International Labor Organization could further promote a collective worker voice in the context of debates over a sustainable “future of work”. In Asia, Nhamo et al. [75] reviewed the progress made to accelerate SDG 7 (Affordable and Clean Energy).

All these efforts towards the SDGs have been reported from various countries, but it is recognized that little evidence of action comes from Latin America. Thus, it is important to know students’ views and their vision of the SDGs as elements linked to their current studies. It is also essential to know about the role of the SDGs in contributing to the economic reactivation in the post-COVID-19 period and which of the SDGs are more attractive for research since carrying out research is the only way to obtain evidence that helps decision making regarding university education and the allocation of economic and human resources.

According to Leal Filho et al. [76], there is a set of urgent research needs to contribute to the SDGs:

1. Increase the interdisciplinary and transdisciplinary nature of sustainability research to be more oriented to the solution to society’s needs.
2. Further develop research at the local level on sustainability to understand and adequately manage local decisions’ impacts on a broader scale.
3. Bringing research on sustainability closer to society, which should be applied when defining directions and the sustainability research agenda.
4. Intensify the communication of scientific results to the different interest groups and share knowledge with them, which requires a change in how sustainability researchers believe they offer better value for the non-academic experience.
5. Promote governance and provide better means to link science with policymaking. Ideally, decisions should be based on sound research that emphasizes tradeoffs and multiple possibilities for action.

3. Methodology

The methodology employed here involves an observational study with both descriptive and inferential design. The main objective is to describe the level of knowledge about SDGs in young university students, their careers with SDGs, and their interests in research about SDGs. Four samples of students from Colombia, Ecuador, Mexico, and Peru are evaluated.

3.1. Instrument

An information review about SDG was carried out to build the data collection questionnaire (see Appendix A). The first version of the online questionnaire was validated by three sustainability and education experts.

Q1 to Q17 were socio-demographic questions. The knowledge, interests, and expectations about SDG were evaluated using a 5-point Likert scale (Q8–Q13):

I know what the United Nations Sustainable Development Goals (SDGs) are.

I have received information about the SDGs by email or social networks.

I have received information about the SDGs from the traditional media (press, radio, and or television).

I have received information about the SDGs in formal education (high school, university, etc.).

I have received information on the SDGs in informal training (NGO workshops, online courses, etc.).

The authorities in my country frequently mention that efforts are being made to address the SDGs.

The statement “I consider that the professional career I am studying is related to” was raised for each SDG. In this way, it was sought to recognize which SDGs the students felt their studies were most linked (Q14–Q30). The statement “The economic development of my country after the COVID-19 pandemic will be positively affected by making efforts related to the following SDGs” was used to recognize which SDGs can serve for the reactivation of the economy, which is valuable since it can be an indicator of the importance of certain SDGs which have more significant support as they are recognized as the most relevant (Q31–Q47). Finally, interest in research in the SDGs was evaluated with the phrase “I am interested in carrying out work or research in” (Q48–Q64). Questions 8 to 64 use a five-point Likert scale, ranging from 1 (“completely disagree”) to 5 (“completely agree”). The students completed the online form anonymously.

3.2. Sample Description

The sample examined consisted of students from four countries. The final version of the questionnaire was uploaded in Google Forms. The data collection process was from 25 October 2020 to 26 November 2020. The objective was to evaluate these four countries specifically because among these countries there are educational similarities, which are reinforced in the Bilateral and Multilateral Economic Complementary Agreements between these countries (ACE for its acronym in Spanish): Mexico and Peru (ACE 8), Colombia–Mexico (ACE 33), Colombia–Ecuador–Peru (Andean Community), and Colombia–Mexico–Peru (Pacific Alliance). Likewise, the countries studied signed in 2019 the agreement to recognize higher education studies, degrees, and diplomas in Latin America and the Caribbean.

Figure 1 shows the original collected data and final data after the cleaning process. The cleaning process was carried out to eliminate incomplete surveys.

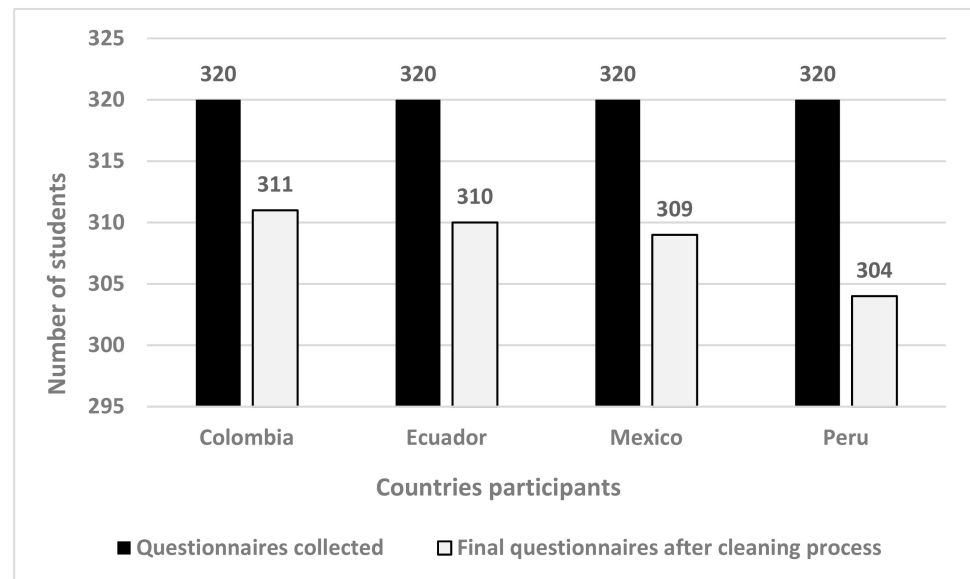


Figure 1. Collected data by country.

Although the sample size has limitations regarding how widely applicable any conclusions drawn from the study might be, the size allows us to determine the SDG approach’s need in universities’ training. The average ages of the students surveyed and related statistics are given in Table 1.

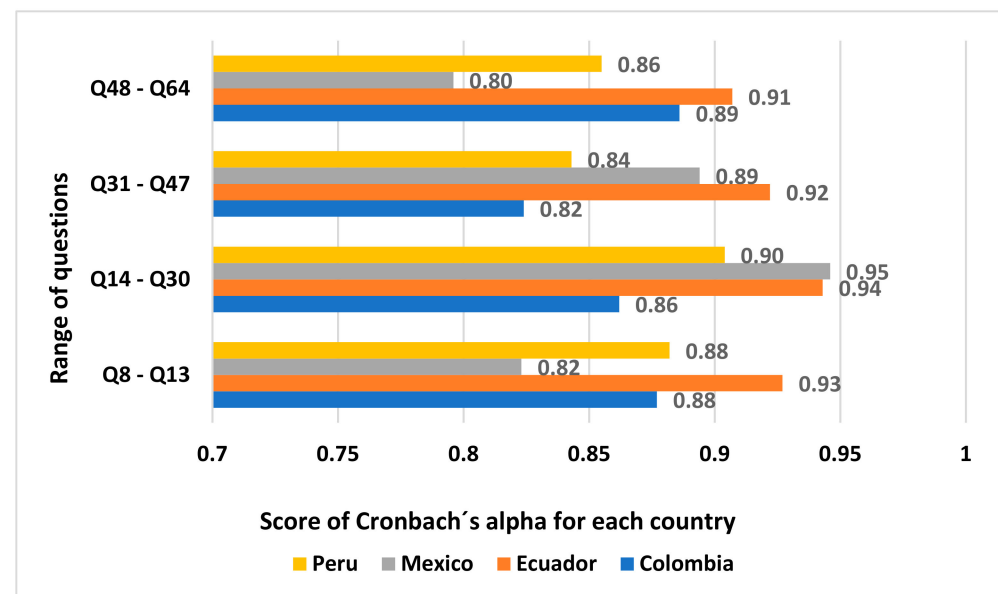
Table 1. Mean, range, and standard deviation in each country.

Country	Mean	Range	Standard Deviation
Colombia	22.453	18–32 years	2.834
Ecuador	22.202	18–33 years	2.693
Mexico	20.358	18–38 years	2.605
Peru	22.288	18–34 years	3.485

3.3. Data Process

The Statistical Package for Social Science (SPSS) v. 26 was employed to evaluate the data collected. The questionnaire's reliability was evaluated with Cronbach's alpha, from which we expect to obtain values higher than 0.7 to consider that a set of items is part of the same construct and ensure reliability [77,78]. The validation of the survey was calculated using Cronbach's alpha.

Figure 2 shows Cronbach's alpha reliability coefficient for the questions for each country. The results show a high level of internal consistency among all the same group of questions.

**Figure 2.** Cronbach's alpha coefficient for each group of questions by countries.

Subsequently, a descriptive analysis of the results was carried out to design a sample's global panorama. Normality was confirmed using Levene's test. To corroborate significant differences between the groups were performed an inferential analysis for the four groups. The one-way ANOVA was also used to recognize significant differences between the four countries' groups (see Table 2). The results showed a statistically significant difference in the values between the countries, with p-values of 0.00.

Table 2. Analysis of variance (ANOVA).

SUMMARY					
Group	Count	Sum	Average	Variance	
Colombia	302	615.21	2.04	3.82	
Ecuador	302	617.68	2.05	3.06	
Mexico	302	579.47	1.92	3.09	
Peru	302	766.86	2.54	5.68	
ANOVA					
Source of Variation	SS	Df	MS	F	<i>p</i> -value
Between groups	68.79	3	22.93	5.85	0.00
Within groups	4711.87	1204	3.92		
Total	4780.66	1207			

SS = Sum of squares; Df = degrees of freedom; MS = Mean squares; F = F-test.

4. Results

Details of Results

Tables 3–6 show the averages, in the form of means, of each group's responses to each group of questions, broken down by country. The breakdown permits differences between the students and countries to be observed.

Table 3 shows the data related to what students think about the government authorities of their country in their effort to promote the SDGs; the low score that was reported from students in Mexico is striking, which may suggest the need to improve the dissemination of information in that country at the university level. The scores for the remaining three countries are quite similar. It can also be seen that students in Ecuador and Colombia report low scores about having received information from the SDGs in informal training, with a significant gap to be covered by future activities in those countries. Students from Mexico show a high score concerning having received formal training regarding the SDGs, which would show the commitment at the institutional level about the most evident SDGs in Mexico. Regarding what is reported by students about receiving information from the media, the scores are very similar among the four countries, although students from Colombia reports the lowest value. Regarding knowledge about the SDGs, students from Mexico reported the highest score and Colombia lower. This observation can be explained based on the availability of programs created and promoted by the corresponding governments.

Table 3. Averages scores based on a five-point Likert scale of knowledge questions.

Questions about Knowledge	Colombia	Ecuador	Mexico	Peru
I know what the SDGs are	2.580	2.784	3.535	3.076
I have received information about the SDGs by email and/or social networks	2.240	2.395	2.641	2.583
I have received information about the SDGs from the traditional media (press, radio, and or television)	2.237	2.432	2.442	2.470
I have received information about the SDGs in formal education (high school, university, etc.)	2.648	2.557	3.389	3.040
I have received information on the SDGs in informal training (NGO workshops, online courses, etc.)	2.370	2.402	2.721	2.669
The authorities in my country frequently mention that efforts are being made to address the SDGs	2.417	2.502	1.824	2.397

Table 4 described the questions about professional career relations with SDG. For the poverty reduction, students from Ecuador reported higher scores. For hunger reduction,

the low score of the students from Mexico was striking, and for health and wellness care and quality education, Mexico reported the lowest value while in gender quality, students from Peru reported the lowest value. Students from Mexico reported access to clean water and sewerage as the highest score, and concerning accessible and non-polluting energy, students from Colombia reported the highest score. For decent work and economic growth and industry, innovation, and infrastructure, students from Mexico showed the highest score. Regarding reduction of inequalities and creating sustainable cities and communities, students from Ecuador reported the highest scores. Responsible consumption and production and climate care scores were quite similar across the four countries. Regarding caring for underwater life, the scores for Mexico and Peru were low, while for caring for life in terrestrial ecosystems, the scores for Mexico were the lowest, and for building peace, justice, and institutions free from corruption, the scores for Peru were the lowest. Regarding building alliances to achieve the above objectives, the scores of the four countries were similar. Decent work and economic growth and industry, innovation, and infrastructure were the two SDGs related to students' careers for four countries.

Table 4. Averages of questions about professional career relation with Sustainable Development Goals (SDGs).

Questions about Professional Career Relation with SDG	Colombia	Ecuador	Mexico	Peru
Poverty reduction	3.587	3.625	3.266	3.381
Hunger reduction	3.470	3.648	2.980	3.245
Health and wellness care	3.550	3.664	2.847	3.384
Quality education	3.347	3.439	3.020	3.159
Gender equality	3.610	3.821	3.611	3.540
Access to clean water and sewerage	3.363	3.372	2.880	3.123
Accessible and non-polluting energy	3.473	3.389	3.252	3.278
Decent work and economic growth	3.880	4.083	4.203	3.954
Industry, innovation, and infrastructure	3.847	3.884	4.116	3.887
Reduction of inequalities	3.593	3.804	3.588	3.583
Creating sustainable cities and communities	3.630	3.681	3.558	3.503
Responsible consumption and production	3.780	3.864	3.744	3.775
Climate care	3.527	3.565	3.130	3.348
Caring for underwater life	3.287	3.346	2.787	2.974
Caring for life in terrestrial ecosystems	3.510	3.512	2.987	3.179
Building peace, justice, and institutions free from corruption	3.430	3.515	3.379	3.252
Building alliances to achieve the above objectives	3.617	3.731	3.761	3.507

Table 5 shows the questions about the importance of SDG for economic development after the COVID-19 pandemic. Regarding poverty reduction and hunger reduction, students from Colombia presented the lowest values. The scores were similar in the four countries for health and wellness care and quality education. Colombia obtained the lowest scores for gender quality while Mexico obtained them for access to clean water and sewerage and accessible and non-polluting energy. For decent work and economic growth, Colombia was the one that reported the lowest score, while for industry, innovation, and infrastructure, and reduction of inequalities, Mexico reported the lowest scores. Students from Mexico considered creating sustainable cities and communities, responsible consumption and production, and climate care with a lower score.

Students from Peru reported the lowest caring score for underwater life and caring for life in terrestrial ecosystems. In contrast, Ecuador reported the highest scores for building peace, justice, and institutions free from corruption and building alliances to achieve the above objectives. Climate care and caring for life in terrestrial ecosystems were the SDGs that Colombian students recognized as the ones that would most influence economic development after the COVID-19 pandemic, while access to clean water and sewerage and responsible were recognized in Ecuador consumption and production. In

Mexico's case, health and wellness care and industry, innovation, and infrastructure were the most reported. Finally, in Peru, health and wellness care and industry, innovation, and infrastructure were the ones that obtained the highest score.

Table 5. Averages of questions about the importance of SDGs for economic development after the COVID-19 pandemic.

Questions about the Importance of SDG for Economic Development after the COVID-19 Pandemic	Colombia	Ecuador	Mexico	Peru
Poverty reduction	3.017	3.156	3.030	3.070
Hunger reduction	3.007	3.146	3.033	3.017
Health and wellness care	3.150	3.262	3.355	3.255
Quality education	3.110	3.243	3.136	3.215
Gender equality	3.073	3.246	3.120	3.172
Access to clean water and sewerage	3.097	3.276	3.047	3.192
Accessible and non-polluting energy	3.133	3.209	2.947	3.179
Decent work and economic growth	3.107	3.219	3.183	3.215
Industry, innovation, and infrastructure	3.100	3.218	3.213	3.222
Reduction of inequalities	3.077	3.223	2.983	3.119
Creating sustainable cities and communities	3.123	3.207	2.920	3.116
Responsible consumption and production	3.123	3.296	3.043	3.205
Climate care	3.197	3.204	2.997	3.166
Caring for underwater life	3.107	3.126	3.104	3.036
Caring for life in terrestrial ecosystems	3.197	3.183	3.194	3.113
Building peace, justice, and institutions free from corruption	3.077	3.169	2.953	3.083
Building alliances to achieve the above objectives	3.140	3.246	3.056	3.179

Table 6 shows that regarding the students' interest regarding the SDGs, poverty reduction and hunger reduction were preferred by Mexico, while Ecuador chose health and wellness care. Quality education had the lowest score from Peru and the highest score from Ecuador. Regarding gender equality, it was Mexico that reported the most significant research interest. Regarding access to clean water and sewerage and accessible and non-polluting energy, the four countries' scores were very similar. Decent work and economic growth and industry, innovation, and infrastructure obtained the highest scores in Mexico. To reduce inequalities, creating sustainable cities and communities, and responsible consumption and production, Colombia reported the lowest scores. For climate care, caring for underwater life, caring for life in terrestrial ecosystems, building peace, justice, and institutions free from corruption, and building alliances to achieve the above objectives, the highest research preference was Mexico. Decent work and economic growth and creating sustainable cities and communities were the main interests in Colombia. In Ecuador and Mexico, the preferences were for decent work and economic growth and building alliances to achieve the above objectives. In Peru, decent work and economic growth, industry, innovation and infrastructure, and responsible consumption and production were the SDGs those most interested students to carry out research.

Table 6. Averages of questions about interest in research on SDG issues.

Questions about Interest in Research in SDG Issues	Colombia	Ecuador	Mexico	Peru
Poverty reduction	3.600	3.721	4.086	3.656
Hunger reduction	3.660	3.754	3.890	3.570
Health and wellness care	3.720	3.867	3.814	3.646
Quality education	3.450	3.611	3.415	3.295
Gender equality	3.617	3.834	4.110	3.685
Access to clean water and sewerage	3.617	3.721	3.821	3.540
Accessible and non-polluting energy	3.693	3.761	3.987	3.626
Decent work and economic growth	3.833	3.983	4.289	3.881
Industry, innovation, and infrastructure	3.763	3.907	4.120	3.861
Reduction of inequalities	3.711	3.870	4.256	3.818
Creating sustainable cities and communities	3.724	3.834	4.103	3.788
Responsible consumption and production	3.680	3.904	4.179	3.861
Climate care	3.677	3.870	4.090	3.762
Caring for underwater life	3.627	3.754	3.831	3.523
Caring for life in terrestrial ecosystems	3.723	3.884	3.980	3.623
Building peace, justice, and institutions free from corruption	3.670	3.827	4.186	3.781
Building alliances to achieve the above objectives	3.707	3.937	4.266	3.772

5. Discussion

The highest score was reported in Mexico and the lowest score in Colombia about the knowledge level declaration. This outcome can be explained by the availability of training programs in the universities about SDG; the availability of programs created and promoted by the governments can be a reason. These results are starting points for the planning of an initial dissemination program that allows all students to receive communications about the SDGs from different channels and at the same time. One of the strategies that can be used to bring students closer to the SDGs is mentioned by Gatti et al. [79], in which the education for sustainable development through business simulation games is proposed. This approach creates a sense of reality in learning by the student by having contact with the direct effects of managerial decisions by promoting sustainability and by observing that this action has an effect on the company that is managed.

Wheeler identified three key issues that a student receiving sustainability training should address: a. Understand in-depth environmental, economic, and social systems. b. Recognize the importance of the interconnection of these systems in a sustainable world. c. Respect the diversity of points of view and interpretations of complex issues. This research provides results that must be evaluated about teachers to know their level to achieve successful training [80]. This research provides results that must be evaluated about teachers to know the level they must have to achieve successful training of students [81], recognizing the best methods that can work as described by Jeronen et al. [82].

The results showed a gap in the SDG knowledge in students, which has also been reported by García-González et al. [83]. Moreover, knowledge gaps have been reported in teachers [84,85]. These outcomes prepare programs to train the professors initially, which requires using various strategies to develop an understanding of each SDG, understand its link to their careers, consider SDGs as part of economic development after the COVID-19 pandemic, and develop the research interest in these SDGs.

To ensure that students can be successfully educated in the SDGs requires specific curricular programming [58]. The importance of this was noted by André and Hastie [86], who reported the significant advantages of SDG programs based on technologies, as they are required to complement face-to-face learning. The observation is consistent with what was reported by Naik et al. [87].

Because it is necessary to make sustainability education successful, it is necessary to follow specific pedagogical and content guidelines as reported by UN [88]. Thus, for example, it is proposed that for education in poverty reduction, cognitive learning

objectives should be established as “The learner understands the concepts of extreme and relative poverty and can critically reflect on their underlying cultural and normative assumptions and practices”. Furthermore, socio-emotional learning objectives such as “The learner can collaborate with others to empower individuals and communities to affect change in the distribution of power and resources in the community and beyond”, behavioral learning objectives such as “The learner can plan, implement, evaluate and replicate activities that contribute to poverty reduction”. Additionally, it is necessary to propose specific workshops with topics such as “The interrelation of poverty, natural hazards, climate change, and other economic, social and environmental shocks and stresses” and use learning approaches and methods such as “Plan and run an awareness campaign about poverty locally and globally”.

After the initial dissemination, the students begin to develop training activities in the classroom and outside the classroom to facilitate the SDGs’ internalization. It is not uncommon to find reports that indicate a low level of knowledge about SDGs in students from different countries and even in different regions of the same country, since the implementation of education for SDGs is still a recent initiative and in progress, as evidenced by Ahamad and Ariffin [89].

Goritz et al. [90] and Kilian et al. [91] describe the great potential of using social networks, such as Twitter, to educate on the SDGs. Despite this, students’ average scores from the four countries considered here are low, which shows that social networks are not being used compellingly for this educational dissemination. However, much of the information that could impact students the most is distributed on mobile phones through apps, as explained by Cerro Velázquez and Morales Méndez [92]. In this way, education can be personalized for the SDGs, according to the user’s browsing preferences and lifestyle, proposing more easily achievable goals.

It is noted that, although students in Mexico can recognize that they have received more information about SDG than their peers in other countries, they have a very low score when referring to the efforts that they feel their authorities are making. It is necessary to reflect on this perception since it is very likely that the country’s authorities are making the necessary efforts but that the students do not perceive these or that their efforts may be focused on SDGs that are less interesting.

It is possible to identify the SDGs that are seen as most linked to the students’ studies. In these results, the low average of students in Mexico about the reduction of hunger is striking. Considering that they are business and engineering students, it is expected that many decision-makers come from those careers; this suggests that the SDGs must receive widespread dissemination in the training of students and specific programs. Something similar is also observed concerning well-being in health, a vital aspect in general, particularly during the COVID-19 pandemic. SDG 3 is linked to this topic via a multidisciplinary approach. However, Ecuador’s high gender equality score shows the results achieved with initiatives from various sources to build a world based on equity.

Access to clean water does not seem to be related to students from Mexico either. The current and projected water crises should contribute to teachers’ and students’ training on the correct water management, which seems today not to be linked to their studies. In the case of students in Peru, a high average was reported in decent work, and this is related to the significant percentage of informal work and employment reported in risky conditions and underpay for a significant number of workers. It is encouraging that students report these topics as linked to their studies. A significant preference for Colombian students is accessible and non-polluting energy, an SDG closely linked to industrial development.

With research interests, interests in creating sustainable cities and communities, responsible consumption, and production were recognized for the four countries. The investigations that can be generated with students focused on the SDG require supervised work with teachers, based on a framework that ensures conducting research that contributes to organizations and ultimately to each country.

As a limitation it is noted that the data have been obtained virtually; it is hoped that future research can be accomplished with in-person data collection to ensure there is no loss of reliability through virtual means.

6. Conclusions

From students' perspectives, it has been possible to evaluate the significance of the SDGs with regard to their current studies and the importance of the SDGs in the post-COVID-19 world and, notably, the SDGs rise to more research from university students. Five years after the launch of the SDGs, it is necessary to evaluate the progress and take more concrete actions from the institutions to achieve results before 2030, having as great support the universities with their professors and students who can generate projects based on the SDG with the expected local and national impact. As one of the first studies in Latin America to evaluate student perspectives, we expect that the results will help countries develop specific strategies that contribute to the SDGs they have prioritized, implementing SDG activities in campus [93,94] and courses in each professional career [95,96].

It would be useful for these results to be analyzed by each country's authorities and compared with the Sustainable Development Report ranking [88], which has Ecuador as 46th, Peru 61st, Colombia 67th, and Mexico 69th among the 193 UN Member States. The report details the level of progress of each country on each specific objective and goal and also details the major challenges remain in each country: Ecuador (SDG 2, 3, 10, and 16), Colombia (SDG 3, 8, 10, and 16), Mexico (SDG 2, 6, 8, 9, 10, 13, and 16) and Peru (SDG 3, 10, and 16).

Universities play a leading role in training new professionals who need a broad vision of sustainability that is theoretically well-grounded and practical and need to be well informed and experienced before developing corresponding research and implementation plans. Having such professionals as employees will allow companies, be they national or transnational, to implement the essence of the SDGs in their business models and to contribute to development and society sustainably, with profits for the company and at the same time the world. Future studies must be developed that focus on the specific objectives of the SDGs and other relevant aspects that need to be addressed if success is to be attained by achieving the 2030 sustainable development goals set by the 193 countries that are part of the United Nations.

As theoretical implications, knowledge about the SDGs and their connection with student studies, the importance of the SDGs during and after the COVID-19 pandemic, and research interests related to the SDGs should help inform university policies. Such information can help each country identify its gaps and options in addressing the SDGs, bearing in mind that there is no single solution for all. Current research shows that the level of knowledge of students about the SDG is different in each country, which leads to thinking about the strategies that are being carried out. What was obtained in the study also shows what students are thinking about their careers and the relationship with the SDGs, being striking to see how various SDGs not considered with their careers as poverty reduction or zero hunger. Another essential piece of information provided by the study is to know what students recognize in the SDGs to be useful in countries' economic development after the COVID-19 pandemic. It has been modified to show that SDGs do not seem relevant for post-pandemic economic reactivation. Finally, the study shows the research interests in SDG; from the universities, they may want to encourage students to research based on SDG so that the data obtained give a more exact vision of student interests.

As practical implications, the results allow universities to carry out similar studies in which students are evaluated about the SDGs' level of knowledge, including the specific goals, both in their theoretical and practical understanding, which will be the basis for the implementation plans in sustainability on the campuses, on the one hand and in the curriculum. The connection that students of their careers feel with the SDGs is necessary so that this reported connection can be strengthened and the teaching of these SDGs in the respective careers can be deepened. The universities' research plans must consider

the student report of interests in the SDGs to promote specific projects that may have extensive participation of professors and students. The research results in SDG must be intimately connected with the contents of the classes dictated in the university programs and, likewise, linked with the activities of social projection that are carried out to function as a bidirectional triangle that allows that they feed regularly.

In terms of societal implications, to the extent that students can commit more to sustainability activities, they will be able to be agents of change in the future. This is evidenced in the generation of government policies, vision, and mission of the companies in where they go to work, generating operational plans based on sustainability and the development of companies with a sustainable orientation. Society will be able to change and embrace sustainability to the extent that its leaders of tomorrow can come empowered based on the SDGs and can be theoretically and practically trained in this area, for which universities have a fundamental role in this process of social change worldwide.

Future studies would benefit from increasing the number of samples in order to obtain better conclusions. They also should evaluate the determinants that can explain the preferences for the SDGs [97], because in this way the curricular plans, as well as theoretical and practical teaching strategies, can be developed considering the preferences of students as well as their primary research interests. This can provide a starting point for the activities within the university campus that allow the teaching of sustainability to be experiential [98]. Finally, another aspect that will be very useful in the coming years is incorporating ICT, as increasing digitization in the study of the SDGs [99,100] would be useful, since processes can be controlled and predicted in a way that provides feedback loops to better control systems and measure efficiency. Likewise, future studies should investigate in companies what type of professional profile they expect from universities so that the necessary measures can be taken to strengthen the student profile towards sustainability.

Author Contributions: Conceptualization, A.A.-R. and S.D.-A.-A.; methodology, A.A.-R. and S.D.-A.-A.; validation, S.D.-A.-A.; formal analysis, A.A.-R.; investigation, V.G.-I., S.M.-F., and G.M.M.-T.; data curation, S.D.-A.-A.; writing—original draft preparation, A.A.-R., S.D.-A.-A., and M.A.R.; writing—review and editing, A.A.-R. and M.A.R.; visualization, A.A.-R., M.A.R., and S.D.-A.-A. All authors have read and agreed to the published version of the manuscript.

Funding: Authors financed this work.

Institutional Review Board Statement: Ethical review and approval were waived for this study, due to the study does not involve any risk to the life or health of the participants. No substance has been tested on the participants or put them in danger at any time.

Informed Consent Statement: Patient consent was waived due to it would not be part of any medical intervention and no drug substance was to be tested.

Data Availability Statement: The data presented in this study are available on request from the corresponding author.

Conflicts of Interest: The authors declare no conflict of interest.

Ethical Approval & Informed Consent: All procedures performed in studies involving human participants followed the 1964 Helsinki Declaration's ethical standards and later amendments or comparable ethical standards. Informed consent was obtained from all individual participants included in the study.

Appendix A Questionnaire

1. Gender a. Male b. Female c. Other
2. Age?
3. What country do you live in?
4. In what type of university do you study? a. Public b. Private
5. In what program are you currently studying?
6. What academic semester are you currently studying? 1–10

7. What is your cumulative grade point average? (Ex. 15/20)

Please, for each statement, mark according to the following assessment:

- [1] Strongly disagree
 - [2] Disagree
 - [3] Neither agree nor disagree
 - [4] Agree
 - [5] Completely agree
8. I know what the United Nations Sustainable Development Goals (SDGs) are.
 9. I have received information about the SDGs by email and/or social networks
 10. I have received information about the SDGs from the traditional media (press, radio and or television)
 11. I have received information about the SDGs in formal education (high school, university, etc.)
 12. I have received information on the SDGs in informal training (e.g., NGO workshops, online courses, etc.)
 13. The authorities in my country frequently mention that efforts are being made to address the SDGs.

I consider that the professional career I am studying is related to:

14. Poverty reduction
15. Hunger reduction
16. Health and wellness care
17. Quality education
18. Gender equality
19. Access to clean water and sewerage
20. Accessible and non-polluting energy
21. Decent work and economic growth
22. Industry, innovation, and infrastructure
23. Reduction of inequalities
24. Creating sustainable cities and communities
25. Responsible consumption and production.
26. Climate care
27. Caring for underwater life.
28. Caring for life in terrestrial ecosystems.
29. Building peace, justice, and institutions free from corruption.
30. Building alliances to achieve the above objectives

The economic development of my country, after the COVID-19 pandemic, will be positively affected by making efforts related to the following SDGs:

31. Poverty reduction
32. Hunger reduction
33. Health and wellness care
34. Quality education Ordinal Likert Scale
35. Gender equality
36. Access to clean water and sewerage
37. Accessible and non-polluting energy
38. Decent work and economic growth
39. Industry, innovation, and infrastructure
40. Reduction of inequalities
41. Creating sustainable cities and communities
42. Responsible consumption and production.
43. Climate care
44. Caring for underwater life.
45. Caring for life in terrestrial ecosystems.
46. Building peace, justice, and institutions free from corruption.

47. Building alliances to achieve the above objectives
I am interested in carrying out work or research in:
48. Poverty reduction
49. Hunger reduction
50. Health and wellness care
51. Quality education
52. Gender equality
53. Access to clean water and sewerage
54. Accessible and non-polluting energy
55. Decent work and economic growth
56. Industry, innovation, and infrastructure
57. Reduction of inequalities
58. Creating sustainable cities and communities
59. Responsible consumption and production
60. Climate care
61. Caring for underwater life.
62. Caring for life in terrestrial ecosystems.
63. Building peace, justice, and institutions free from corruption.
64. Building alliances to achieve the above objectives

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