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Design and Implementation of Teaching–Learning Activities Focused on Improving the Knowledge, the Awareness and the Perception of the Relationship between the SDGs and the Future Profession of University Students

Raul Oltra-Badenes ^{1,*}, Vicente Guerola-Navarro ¹, José-Antonio Gil-Gómez ² and Dolores Botella-Carrubi ¹¹ Department of Business Organization, Universitat Politècnica de València, 46022 Valencia, Spain² Instituto Universitario de Automática e Informática Industrial, Universitat Politècnica de València, Camino de Vera s/n, 46022 Valencia, Spain

* Correspondence: rauloltra@doe.upv.es

Abstract: The achievement of the Sustainable Development Goals (SDGs) in the coming years is a very important milestone for the sustainability of the planet. In order to achieve these objectives, it is essential that current students, who will be the workers of the future, know the SDGs and are aware of their importance. Therefore, it is necessary to know what is the knowledge and awareness that current students have and their perception regarding the relationship of their future profession with the achievement of the SDGs. In this way, actions can be proposed and implemented that can improve students' perception and knowledge of the SDGs. This paper presents an investigation that identifies the knowledge and awareness that university students have about the SDGs and the opinion they have regarding how their professional practice can help achieve them. This research is carried out by analyzing the opinion of students of various degrees and master's degrees from a Spanish University. Based on this, a series of teaching–learning activities are proposed that are capable of improving the degree of knowledge and awareness of the students, as well as the perception that they may have of how their profession can help achieve the SDGs.

Keywords: SDG; sustainable development goals; sustainability; university students; students' perception



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1. Introduction

In recent years, awareness of the importance of sustainability has been increasing, as the negative impact of man and his activities on the environment, the depletion of resources and social inequalities became evident [1]. It is evident that the unstoppable and growing economic and technological development brings unquestionable benefits, but it also brings other not-so-good consequences for society and the environment. That is where sustainable development must play an important role, so that there can be a lasting future on the planet, combined with that constant economic and technological growth [2].

In general, the term “sustainability”, associated with sustainable development, has generally been used to indicate “the ability to maintain”, although sustainability can also mean “the ability to resist and adapt” [3], and is based on three basic dimensions: economic, social and environmental [4,5].

In this sense, the challenge is to achieve economic well-being, social equity and environmental protection, based on long-term actions. The integration of these three dimensions (economic, social and environmental) results in a new productive paradigm, from the perspective of sustainable development, emphasizing the sustainability of products and processes and enabling a better quality of life for people within their environment [6]. Thus, in the environmental sphere, natural resources must be used in a manner that is not harmful to future generations, minimizing the impacts of industrial processes. From the economic

perspective, it is necessary to preserve the profitability of the company and not compromise its economic development. Finally, in the social field, which includes the issue of social justice, the ultimate goal is the development of a fairer world, through relationships with all stakeholders [7].

As a consequence of all this, “sustainable management” or “management for sustainability” arises based on the aforementioned economic, social and environmental dimensions, and its objective is to provide benefits for the company, society and the environment. Sustainable management is defined by [8] as “a business approach that takes into account the organization and its ecosystem in management practices and decision-making, including evaluation indicators in the economic, environmental and social dimensions”, while for [9] “Managing for sustainability is considered critical to the development of corporate sustainability, and is fundamentally about strategic organizational development and change”. These aspects have driven a clear trend in business models towards more sustainable models, transforming the traditional linear model towards more circular models, prioritizing the use of resources and reducing the consumption of raw materials.

In this environment, with the growing awareness of sustainability and sustainable development, in 2015 the Sustainable Development Goals emerged, within the “2030 Agenda for Sustainable Development”, approved by the UN, thus creating “an opportunity for countries and their societies embark on a new path with which to improve the lives of all, leaving no one behind” [10]. The Agenda has 17 Sustainable Development Goals (SDGs), which include goals from the elimination of poverty to the fight against climate change, through education, equality for women, the defense of the environment or the design of our cities. These 17 SDGs are integrated through 169 concrete goals to be developed, so that action in one area will affect results in other areas, and it must be taken into account at all times that development must balance social, economic and environmental sustainability. Currently, progress is being made in the development of this SDG initiative in many places, generating and implementing actions, strategies and policies to achieve the 17 SDGs. However, overall, action to achieve the Sustainable Development Goals is not yet moving at the speed and scale needed.

With less than 10 years to go to achieve the Sustainable Development Goals, world leaders called for a decade of action and results for sustainable development, pledging to mobilize funds, improve national implementation and strengthen institutions to achieve the goals on time, by 2030, leaving no one behind.

The United Nations Secretary General called at the SDG Summit in September 2019 for all sectors of society to mobilize for a decade of action on three levels: action at the global level to ensure greater leadership, more resources and smarter solutions regarding the Sustainable Development Goals; action at the local level that includes the necessary transitions in the policies, budgets, institutions and regulatory frameworks of governments, cities and local authorities; and the action of people, including youth, civil society, the media, the private sector, unions, academia and other actors, to generate an unstoppable movement that drives the necessary transformations. For example, the Government of Spain has worked actively in the elaboration of this universal and transformative agenda [11].

Addressing the challenges of the SDGs will require new insights, new ways of doing things, difficult choices between competing options and in some cases profound transformations.

Of course, this directly involves universities, as organizations that promote technological and social progress through research, discovery, creation and the adoption of knowledge [12]. Universities attract and foster talent and creativity and are key players in regional and national innovation systems. These roles are critical in helping the global community understand the challenges, opportunities and interactions among the SDGs; develop and implement solutions; develop and evaluate policy options and transformation pathways; and track progress. Universities have already started to implement programs to adapt to this initiative [12,13]. However, are college students aware of all this? They are the ones who, in the near future, must develop and support the strategies and actions necessary to meet these objectives. Without them and their support, it is virtually impossible to

achieve these goals. Therefore, it is essential that university students know the SDGs and what they consist of. Not only that, they also need to be aware of the importance they have, both for the present and for the future, and the role they can play in achieving those goals, both personally and professionally.

However, university students, in general, say they do not know the Sustainable Development Goals and that the information they have received through various means, including university teaching and social networks, is very scarce [14,15]. In addition, in achieving the SDGs, they value the professional implications less than the personal ones [14].

In this way, in view of this situation that exists in the university environment, it is necessary to investigate the degree of knowledge about the SDGs that university students have, as well as the existing awareness towards them. Knowing this, appropriate strategies and training activities can be proposed, which can integrate the SDGs into university education, so that students can develop their future professional activity taking them into account and focusing at all times on contributing as much as possible within the reach of the SDGs.

Therefore, the final goal is to get university students to appreciate the importance of the SDGs and the possible influence that they, on a personal level, but especially professionally, can have in achieving them. In this way, in the future, they will be able to direct their professional activity towards the achievement of the SDGs in an integrated way with their particular professional objectives.

To achieve this final goal, the research presented in this paper is developed, and its main objective is to design and develop teaching–learning activities, appropriate to the situation and level of knowledge of university students, so that they can be put into practice in an integrated way with the contents of the engineering study subjects and, in this way, train students in the SDGs and how they can help to achieve them.

2. Related Works

There are studies that, without specifically focusing on the SDGs, do make interesting progress in their development in an educational environment. For example, Zhu et al. [16] propose the design of an interactive communication assistance system for university students with hearing disabilities based on the recognition and representation of gestures. Other works explore the possibility and methods of integrating disability education to different degrees and in different ways [17,18].

In another line, there are works that question Education for the Sustainable Development Goals (ESDG) from the point of view of critical theory and eco-pedagogy [19], which questions the discourse of sustainable development, the SDGs and the ESDG, stressing that they do not address the ideology of prioritizing economic growth, continuous industrial production and anthropocentrism [20]. Subsequently, this criticism has been directed specifically towards the Sustainable Development Goals (SDGs), which mainly address social and economic development [21]. However, Zhang et al. [22] develop an effective model of distance education for sustainable development based on advanced technological solutions and strategies for self-regulation in online learning environments.

Other works focus specifically on how to enhance the teaching of some particular SDGs. In this line, you can find works such as that of [23], which try to illuminate the relationship between the Sustainable Development Goals (SDGs), in particular, good health and well-being (SDG 3), quality education (SDG 4), reduction of inequalities (SDG 10), sustainable cities and communities (SDG 11), and partnerships for the goals (SDG 17) through the participation of experts through classroom experience in a speech pathology course and the pre-registration language. Other examples are [24], which focuses on SDG 4, SDG 10 and SDG 11 and seeking educational excellence, equity and inclusion for multilingual aboriginal students in Australia or that of [25], which seeks to know how teachers and students perceive transversal competences in terms of the sustainability of life

from a social, economic and ecological point of view and which focuses on SDG 5, SDG 6 and SDG 14.

More specifically, you can find works that seem closely related to the study presented here, in which the degree of knowledge or awareness regarding the SDGs is investigated in different university groups, especially students. Thus, there are works that focus on finding out the degree of knowledge that students have regarding the SDGs [26–31], the implementation of the SDGs in the curricula [29], specific personal attitudes regarding sustainability [32,33] or the awareness and perception of sustainability in general [34].

There are also works that focus on the perception of the SDGs by teachers and their implementation in the classroom, as in the case of [35] who is framed in engineering studies or that of [36], which focuses on physical education studies.

Another interesting work is that of [37], which initially seems very similar to the one proposed in the research presented here. However, the research by [37] focuses on the general opinion on the implementation of the SDGs in the study plans that students have followed. The work of [38] seems closer, which studies the perception that students have about the level of the insertion of sustainability in their studies and the importance they give it (in the environmental, social and economic dimensions).

However, none of the studies that have been reviewed specifically focus on the relationship that students perceive between the SDGs and their future profession, which they will pursue once they finish their university studies.

3. Materials and Methods

The development of this research has been structured in 3 phases. In the first phase, the existing situation regarding the SDGs in students is analyzed. Based on the results observed and extracted, in the second phase a series of activities are proposed to improve the situation. Finally, in the third phase, the activities are implemented in the classroom and the results obtained are analyzed. In this way, this work not only investigates and identifies the situation of university students in terms of the SDGs, but also teaching–learning activities that can improve that identified situation.

Next, the methodology and development of the three phases are explained. Each of these phases, in turn, is made up of tasks. Each phase and the work carried out in it are described below.

3.1. Phase 1: Survey Design, Data Collection and Analysis Methodology

Its main objective is to analyze the degree of knowledge that university students have regarding the SDGs, as well as their perception regarding the importance of the SDGs in their education and the relationship that may exist between their future profession and the SDGs. To do this, a questionnaire appropriate to the investigation will be designed. This questionnaire will be transferred to the students for their completion, in such a way that it will allow the obtainment of the information necessary to carry out the planned analysis. In the next sections, all the needed actions for performing this study are described.

3.1.1. Survey Design

For the design of the survey, first of all, research papers that propose surveys with similar objectives were searched for and reviewed. To carry out this search, the Web of Science database was basically used, searching for different combinations of terms such as “Sustainable Development Goals”, “SDG”, “Survey”, “Questionnaire”, “Perception”, “University students” or “Awareness”. In addition to the papers already presented in the Literature Review section, other papers that use surveys regarding the SDGs in different university environments were found [39–44]. However, in the same way as the surveys used in the papers presented in the literature review section, most of the papers found and reviewed are focused on knowing the degree of knowledge of the SDGs [15,42,45] and the degree of implementation, attitudes or actions adopted by universities [43,44].

Therefore, these surveys and their main objectives are different from the approach of the present work, in which we try to find out not only the level of knowledge, but also what is the perception that students have regarding the SDGs, the degree of awareness they have about them and the relations that they think exist between the SDGs and the development of their future job.

However, there is a fairly recent work in the line of this research. It is specifically the article by Aleixo et al. [41]. The study was developed through a survey of university students in Portugal. However, as can be seen in the questions that are posed, it focuses on the perception of the training they have received regarding the SDGs and not so much on how they perceive them. In its conclusions, it is indicated that almost all students agree that higher education institutions (HEIs) should actively incorporate and promote sustainable development in their training offer. However, currently only about 25% of students feel that that Sustainable Development (SD) topic is covered in their course, and 21% report that it is not covered at all in the course they attend. The vast majority of students (94%) feel that HEIs could do more to train students with skills in relation to the SDGs. When asked about the SDGs, half of the students claim to know what they are, 34% have heard of them but do not know what they are and 16% have never heard of them. This shows that, although HEIs are already developing SD skills, they still have a role to play in training students in the area of the SDGs.

However, even though the study seems closely related to the research presented here, the survey presented does not appropriately analyze how students perceive the SDGs and what importance they believe they have in their work and personal future. It does go into details of their behavior taking into account recycling or concern for environmental climate change.

Once again, it is confirmed that there are no studies or surveys in relation to the specific research presented here. There are studies that investigate what students know about the SDGs but not so much to know how they perceive them.

As a result, after reviewing these and other existing works and the questions they pose in their questionnaires, a survey has been designed and developed, in which some of the questions from these studies are used and others have been added.

The questionnaire was designed and validated, taking into account that the validity of an instrument refers to the degree to which it measures what is intended [46,47]. According to the indications of [48], a validation process of an instrument can be conducted at two levels: on the one hand, the validation of experts, to adjust its content validity by adjusting it to the variables under study and, on the other hand, the application of the instrument to a small sample of the study population, to verify its clarity. The consultation of experts is the most common method in education [49].

Following this two-step scheme, the questionnaire was initially validated by five experts, who selflessly collaborated to validate the content of the different questions. The experts are academics and have important and proven research careers in the area, as well as extensive experience in the inclusion of sustainability in higher education.

The initial version of the questionnaire was sent to them by email, together with the basic data of the investigation. With this, the experts made different comments and recommendations, on the one hand, regarding the structure and, on the other, regarding the wording of some questions. With the recommendations given by the experts, a second version of the questionnaire was configured, to transfer it to a pilot group of 10 students of the grades under study.

In this way, the clarity of the statements of the questions and the adequacy of the target audience, as well as the usability of the tool, were verified. In addition, the instructions in the Google form header were also verified for clarity, and it was confirmed that the online form worked correctly. Finally, this pilot allowed for testing the time needed to answer the form. With the feedback from the pilot group of students, the questionnaire was modified again. Finally, a survey was proposed with 38 questions, divided into 5 blocks, which are shown below:

- Block 1: Sociological identification. Five questions in order to know the respondent's profile.
- Block 2: Degree of general knowledge. One subjective question, where the respondents respond regarding their perception of their own knowledge about the SDGs.
- Block 3: Awareness. Five questions designed to know the level of awareness of the respondent regarding the SDGs.
- Block 4: Real knowledge of the SDGs. In this block, 10 basic questions about SDGs are asked, in which there is a correct answer. It serves to assess the "real" knowledge that students have regarding the SDGs, in order to analyze the level of knowledge with the level of awareness.
- Block 5: Relationship between the profession and each of the SDGs. In this block, 17 questions are presented to know to what extent students believe that their future profession (for which they are studying) can contribute to the achievement of each of the SDGs

The survey was tested and validated again with several small groups of students of the degrees of the Polytechnic University of Valencia included in the study (groups of between 3 and 5 students). In this way, the students gave their feedback again and the pertinent corrections and modifications were made to adjust the questionnaire to the requirements of the end user (the student), including all the degrees involved in the research. Finally, the definitive survey was obtained, which is the one transferred in a massive way to all the groups of students that are included in the research and educational improvement project.

3.1.2. Delivery of the Survey and Collection of Results

Once the survey was designed and validated in an appropriate way for the research needs, the next step was to transfer it to the students so that they could fill it out and obtain the information.

For this, the survey was implemented in the "Google Forms" tool, in a completely anonymous format and making it explicit to the participants, they voluntarily agreed to answer it and the link was transferred to the students, so that they could access it to fill it out.

In order to carry out the study, the collaboration of students from different courses, different degrees and even different campuses of the Universitat Politècnica de València (Vera-Valencia Campus and Alcoy Campus) was been requested, trying to make the information (derived from their responses to the questionnaire prepared for such) as representative as possible. Specifically, it was chosen to collect information from students of subjects from different courses of the following university degrees and university master's degrees:

- Double Degree in Telecommunication and in Mathematics;
- Double Degree in Business Administration and Management and in Computer Engineering;
- Degree in Computer Engineering;
- Degree in Digital Technology and Multimedia;
- Degree in Business Administration and Management;
- Degree in Organizational Engineering;
- Degree in Computer Engineering;
- Master's Degree in Telecommunication Engineering

The subjects, as well as the degrees and master's degrees chosen, were selected according to the following criteria:

- Despite all of them being confined to the Polytechnic University, degrees connected not only to technical university careers (Telecommunication, Computer Science, etc.) but also more humanistic degrees (Business Administration and Management) were chosen.
- Among these degrees and master's degrees, courses were divided as follows:
 - Initials: to check the initial stage before the students are integrated into the university community;

- Intermediate: to see how students evolve after the impact of the first courses;
- Finals: with the aim of knowing how students leave the labor market aware.

Thus, this study was carried out with the information compiled from university students from different carefully selected fields, with no desire to represent the entire university community, but in order to obtain a first impression as accurate as possible about the state of knowledge and awareness of the students regarding the SDGs.

To do this, the survey was configured and passed to the groups of students during classes, in the first days, at the beginning of the respective subjects related to the research.

3.1.3. Analysis Methodology

Once the answers of the students were been collected through the Google Forms application, the information contained in said answers was be analyzed, to know the real situation and to be able to propose appropriate actions to it.

After requesting the collaboration of the students of the chosen sample, of a total of 128 potential students, a response was obtained from 110 students, which represents an 86% response, acceptable from the point of view of the representativeness of the sample with respect to the potential [46]. However, this sample is not intended to be extrapolated to the entire university population, it is only intended to give a first impression of what a later study on a larger scale may be.

Respondent responses have been calibrated as follows:

- Block 2—According to the answer chosen by the individual to the generic self-assessment question, a value between “1” (minimum self-assessed knowledge) and “5” (maximum self-assessed knowledge) has been assigned.
- Block 3—In this case, the 5 questions in this block are raised based on a Likert scale (from 1 to 5), with “1” being the minimum value of awareness and “5” the maximum value. In order to have a global assessment of awareness, the average of the 5 questions has been taken, since all 5 have the same weight.
- Block 4—In order to be able to assign a value between “0” (minimum real knowledge) and “10” (maximum real knowledge) of each individual about the SDGs, the following scores have been assigned (and added) in each individual’s account:
 - A “1” for each correct answer (among the 10 total questions);
 - A “0” for each wrong answer (among the 10 total questions).
- Block 5—The 17 questions in this block are raised based on a Likert scale (from 1 to 5) with “1” being the minimum value of the relationship between the profession and each of the SDGs and “5” the maximum value. In this case, the answers have not been grouped, since it is intended to know the specific information for each of the SDGs

After calibrating the data, the analysis of the results was performed. The results of the analysis will be detailed in the Section 4, based on the blocks of questions from the survey.

Once it has been explained how the survey is going to be designed and how the results are going to be calibrated and evaluated (phase 1), we will explain in the next section (phase 2) what activities are proposed in the project and how they are proposed to be carried out.

3.2. Phase 2: Design of Teaching–Learning Activities That Can Develop Professional Skills That Can Lead to the Development of the SDGs in an Integrated Way with Their Profession

In line with the commitment that the UN asks all the inhabitants of the planet to assume the SDGs as their own and put all their personal and professional efforts into achieving these goals, a series of activities have been designed and implemented within the normal development of the learning of students at the Polytechnic University of Valencia.

Among the SDGs proposed by the UN, this study focuses on the proposal of teaching–learning activities for the development of the following SDGs, attending to the results of phase 1 as it will be justified in the Section 4:

- SDG 4—quality education;
- SDG 5—gender equality;

- SDG 8—decent work and economic growth;
- SDG 10—reduce inequality.

In this section the guidelines for the development of concrete activities that promote these selected four SDGs are presented.

3.2.1. SDG 4—Quality Education

In these times in which society has learned that it is not always possible, or even more efficient, to move and use physical means to achieve a quality education, the use of network and communication technology to transmit knowledge has become one of the training options with the greatest scope and effectiveness. The months in which individuals have lived confined to avoid contagion in the time of COVID-19 have reinforced the idea that quality education can be achieved by technologically advanced means to reach people and places that could not be reached otherwise due to cultural, economic and geographical circumstances or simply personal circumstances such as the lack of time to go to educational centers.

Given that SDG number 4 “Quality Education” is one of those chosen for this study due to its special circumstances, a series of activities is proposed to determine which factors can make the transmission of knowledge a successful process in this environment, in which online training is becoming increasingly important as a way to overcome problems, such as the lack of the possibility of attending face-to-face training, and even as a way of pursuing the achievement of a more sustainable world by saving fuel and the consequent decrease in pollution derived from the reduction in trips to training centers.

Considering that, if current students are going to be the ones who will teach future students or at least those that will fight for their children to have the best quality education, requesting that these current students evaluate and propose factors for teaching improvement should lead to increasing the level of achievement of this SDG in the future through their personal life and their professional future. In this case, three activities are proposed to reach the “quality of education” SDG, especially focused on the online format:

- A study on the determining factors to maintain a quality education in intensive online format environments;
- A practical example of how to plan and develop a participatory group dynamic through an online platform;
- The use of seminars given by prestigious professionals for improving the sense of usefulness of the teaching received.

The following details how the execution of these activities was planned.

Study on the Determining Factors to Maintain a Quality Education in Intensive Online Format Environments

Once a population sample that is highly intensive in the use of online training was selected (as the university community has been in times of the COVID-19 pandemic and is currently with an increasing degree of acceptance), the participants of the training were interviewed for a sample on their assessment of what factors help to maintain the level of quality of teaching within an online training environment.

This study values the fact that the study participants are university students who are credited with a high degree of the following:

- Academic maturity (due to their previous studies and due to the nature and high demand of the studies they are currently studying);
- A proximity to their landing in the world of work, with a presumable high impact on society through the development of their imminent professional careers;
- A link between their personal group (through life within the university community) and social aspects (as it is a vital phase of high relational capacity).

With the presumption that these characteristics of the sample population will favor both obtaining valuable conclusions and reaching a high impact of the activities that may

be implemented, the results of the interviews should provide a representative picture of what factors are considered (according to his experience) most relevant to obtain a quality education in today's highly technical educational environment and with intensive use of the online format coexisting with the face-to-face format.

This exercise should provide current students with a practical and valuable perspective to strive for quality education through the performance of their future professional work.

Practical Example on How to Plan and Develop a Participatory Group Dynamic through an Online Platform

It is easily understandable how difficult it is to propose the development of a "group dynamics" type session in an online format, if it is intended that all the participants get involved as they would in a similar session but developed in a face-to-face environment.

In order to check which accelerators can be used to make the session as dynamic as possible and thus be productive and lead to the maximum possible learning for the participants, the use of group dynamics is proposed, such as the "Underground shelter" or "Atomic Bunker". In this type of dynamic, aspects such as the acceptance of diversity are worked on, specifically gender perspective, age, sexual orientation, personality and psychological background, which is why they also impact other SDGs such as SDG 5 "Gender equality". The proposal in particular is about carrying out the dynamics taking advantage of a practice session at the university and that the participating students assess whether or not the accelerators used have been valuable for the use of the session. As in the previous proposal, it is about the conclusions obtained at present helping students to develop tools and soft skills that in the future provide a quality education to future students and thereby promote SDG 4 of "quality education".

It is proposed to carry out the session using the following accelerators:

- Providing previous information to participants, in order that participants come to the session aware and determined to participate actively: objective of the session, rules of the game and factors that can make the game fail or succeed.
- The previous selection of roles and preparation of the dynamics, encouraging the participants to get involved in the choice of roles: the director of the session shares the list of roles and helps the participants to prepare previously how to assume each role and how to play the game.
- Before and after the session, holding a discussion about previous expectations and final conclusions.

The objective is for the participants, after discussing the practical results, to assign a value to each one of the accelerators, in order to have an action plan for the future performance of similar activities with success and aligned with the SDG of "quality education".

Use of Seminars Given by Prestigious Professionals for Improving the Sense of Usefulness of the Teaching Received

It is generally recognized that it is more productive to diversify the information sources to which attention is paid, since this option favors overcoming resistance to change and accepting new postulates that would end up losing interest if were exposed by the habitual information source. Translated, this approach to the ability of the same speaker or teacher to maintain the training tension of the students within an entire training cycle suggests that introducing some different speakers from the usual one can help at certain moments of said training cycle. In this sense, it is proposed, with the objective of detecting which are the factors that can lead to a better use of teaching and thus help students to impact their professional future in SDG 4 "quality education", that external professionals of recognized professional prestige deliver seminars to students and that the students themselves evaluate the impact.

In order to carry out these seminars, which can/should be taught naturally in an online format to encourage the best professionals to agree to spend time free of charge and disinterestedly in these tasks, it is proposed that the professionals:

- Have a recognized prestige;
- Develop their usual work in a conceptual field related to the training cycle in which they will deliver these seminars;
- Provide students with a prior knowledge and expectations questionnaire;
- Receive feedback after the performance of the seminars.

With all this, it is expected that the seminars will detect which are the success factors that these students themselves will use as a tool in their future professional work in the event that they have to transmit knowledge to colleagues, partners, clients, etc.

3.2.2. SDG 5—Gender Equality

Among the SDGs, one of the most representative and relevant in today's society, both because of the starting point and the impact it should have on the entire planet in terms of equality and equity between people of different sex, is SDG 5 "Gender equality". In order to make students aware of the role they can develop in achieving this objective, it is proposed to use a well-known group dynamic such as the "Atomic Disaster" or "Subterranean Bunker" but modified with certain accelerators that derive the development and conclusions towards aspects related to the SDG of gender equality. The work scenario is as follows: there has been a nuclear disaster and in the only atomic shelter that is open only five places remain. At the door, wanting to enter, are the ten people listed below. It is about each student adopting a role corresponding to one of these ten characters, and, after a dramatized debate between them, they must choose (by consensus if possible), in order of preference, the five that will be saved.

The main learning traditionally pursued in this practice is to evaluate the influence of stereotypes in decision making involving interpersonal relationships. In this case, adapting the content and the discussion accelerators, the second main learning will be how gender perspective influences the practical exercise development. It is intended that students verify whether, in addition to their prejudices towards people with certain stereotypes, they have considered or not the better or worse acceptance that people of different sexes have towards their own vital preferences. From the debate on the conclusions that the participants should draw from the session, we hope that they will reconsider their own attitudes and take a position as active actors in reducing gender inequality. With this exercise, it is intended to ensure that these individuals will be key in their professional future in order to generate environments of acceptance of gender diversity.

The accelerators used in this modified dynamic are proposed to be the following:

- That just half of the roles assigned are women;
- That the debate is subtly directed to the consideration of whether or not the fact of being a woman has been decisive in choosing that each role has been saved.

The results should make the students reflect on which of the stereotypes has generated greater or worse rejection and in this case if the female gender has been a factor of acceptance or rejection.

3.2.3. SDG 8—Decent Work and Economic Growth

One of the greatest impacts that this project can have with regard to the achievement of the SDGs through the future professional work of the students is on Sustainable Development Goal number 8 "Decent work and economic growth". In this case, it is intended to develop activities to make students aware of the role they can play in reducing inequality in the assessment and execution of each professional task and to strengthen the equitable and fair system of tasks and rewards within the work environments in which they are going to develop their professional careers.

In order for students to obtain valuable first-hand input on how actions are developed within companies to motivate staff and for the acceptance of diversity, the delivery of practical and dynamic sessions is proposed in which professionals from two different visions share their preferences and experiences. Digital humanism, as one of the current present and future trends in personal motivation and the acceptance of diversity within

technical professional environments, is intended to be debated after the presentation of each of the speakers in the seminars.

Specifically, and to cover two different points of the conception of motivation and diversity management, it is proposed that the speakers in the seminars be chosen according to the following criteria:

- Be responsible for relevant departments in their companies;
- Develop high responsibility in the management of personal assets;
- Work in companies from the information and communication technologies (ICT) sector, intensively technified;
- Belong to companies that should be comparable in size and dedication.

With the presentation and subsequent debate between speakers and students on how the companies of the speakers manage motivation and diversity, the aim is to make students aware of management alternatives that they can put into practice in their professional future in the line of seeking Sustainable Development Goal number 8 “Decent work and economic growth”.

3.2.4. SDG 10—Reduce Inequality

With the objective of developing SDG 10 “Reduce inequality between countries”, the application of the Game on International Markets is proposed with certain accelerators. In this game, we try to simulate trade relations between developed countries (with many technological resources but few natural resources), underdeveloped countries (just the opposite, with many natural resources but little technology and means of transformation) and emerging countries (with certain natural resources and developing technological processes). Participants receive a series of resources (scissors, pencils, paper, etc.) that they pretend are raw materials and technology (tools and know-how), with which they must achieve geometric shapes whose value will become the gross domestic product of the chosen country, being able to establish trade relations between countries. After the game, normally the rich countries should be richer than before starting the game and the poor countries should have become poorer, unless some compensation or collaboration mechanism has been established between them.

With this game, in the line of promoting SDG 10, it is intended to introduce a series of accelerators that make participants understand the reasons why countries deepen their wealth/poverty and give them the option to break this inertia to obtain better results globally. The accelerators that are proposed to promote knowledge of SDG 10 are:

- Provide valuable information (tips, tricks, etc.) to underdeveloped countries, so that the game is balanced in their favor;
- Restrict or enhance commercial exchanges as the game progresses to favor countries that need it;
- Depending on the higher or lower level of quality of the figures obtained at the end of the game, modify the expected initial value, thus introducing a distortion in the market that favors countries with fewer resources;
- Establish mandatory cooperation mechanisms between countries, favoring the undeveloped ones.

Basically, we allow students to learn to force relationships between groups (representing countries) to move from a win–lose model to a win–win model. The objective is therefore that students learn to value as positive reductions in the poverty and inequalities between countries in the world, through a game that pretends to be precisely the global world market.

Once the methodological proposal of phases 1 and 2 has been explained, the following section details the results obtained in each of these two phases.

4. Results

After carrying out the research project proposed in this study, categorizable results have been obtained in two different areas:

- General results derived from the responses on students' general knowledge of the SDGs.
- Specific results affected by the initiatives implemented around each of the SDGs selected as the focus of this study.

These separate results are detailed below in both categories.

4.1. Data Analysis from the Survey Results

In the first place, a result obtained from the research carried out is the survey. This survey can be used for other research work, which intends to carry out similar studies in other populations, not only of university students, but of groups of people of any kind.

However, the analysis of the data obtained in the surveys also provides some interesting results, which are analyzed below based on the blocks that make up the questionnaire and which allow the design of activities that improve the development of the SDGs.

First of all, regarding Block 2: Self-assessment of the respondent on their knowledge and awareness of the SDGs "Do you know what the SDGs are?", Table 1 shows the sample distribution of individuals according to their self-assessed knowledge about the SDGs.

Table 1. Sample distribution of individuals according to their self-assessed knowledge about the SDGs (source: own elaboration).

Self-Assessed	Sample Distribution
Excellent	0.00%
Good	24.55%
Acceptable	22.73%
Poor	19.09%
Very poor	33.64%

It can be seen that a third of the sample of individuals considers that their knowledge of the SDGs is very poor and that the rest of the individuals consider themselves (almost equally) to have good, acceptable or poor knowledge. No one considers themselves an expert on the SDGs.

The average value awarded was 2.38, which is below the average value, which would be 3.

Regarding Block 3, in which the degree of awareness that the students have is measured, the results that are presented in the following Table 2 were obtained.

Table 2. Sample distribution of individuals according to their awareness about the SDGs (source: own elaboration).

Awareness	Sample Distribution
Excellent	7.27%
Good	48.184%
Acceptable	40.91%
Poor	3.64%
Very poor	0%

As can be seen, almost half of the students are at a "Good" awareness level, while 40.91% have an acceptable awareness. Only 3.64% have a "Poor" result in this block of the survey. In addition, an average of 3.56 was obtained, which is slightly above the average value. Therefore, the results are satisfactory in this aspect.

On the other hand, regarding Block 4, Table 3 shows the sample distribution of individuals according to their real and calculated knowledge about the SDGs.

Table 3. Sample distribution of individuals according to their real knowledge about the SDGs (source: own elaboration).

Real Knowledge	Sample Distribution
Excellent	13.64%
Good	33.64%
Acceptable	26.36%
Poor	10.00%
Very poor	16.36%

The results of Table 3 show a different distribution to the awareness one, given that here a third of the sample population demonstrates having a good knowledge, a little less than a third demonstrates an acceptable knowledge and the individuals that show an excellent, poor or very poor knowledge are distributed almost equally (and to a lesser extent than the previous ones).

Finally, in Block 5 of the survey, students are asked to indicate to what degree, from 1 to 5, they believe that their future profession (for which they are studying) can contribute to the achievement of each of the following SDGs. There are 5 answer options, from the value 1 (I do not believe at all that my profession can help achieve this goal) to value 5 (I believe that my profession can greatly help to achieve this goal).

Below are the results obtained in the form of a graph (Figure 1), in which you can see the degree (between 1 and 5) that the students believe that their future profession can contribute to achieving each of the SDGs.

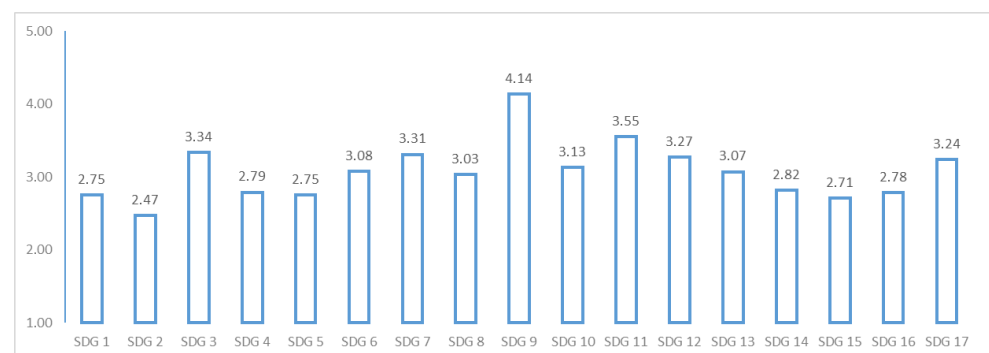


Figure 1. Contribution that development of future profession can make to the achievement of each SDG (source: own elaboration).

It should be noted that in 7 of the 17 SDGs a score was obtained below the average value of the scale, which is 3. In other words, the students consider that the exercise of their profession cannot contribute to achieving those objectives.

These SDGs that receive such a low rating are specifically as follows:

- Goal 1: no poverty
- Goal 2: zero hunger
- Goal 4: quality education
- Goal 5: gender equality
- Goal 14: life below water
- Goal 15: life on land
- Goal 16: peace and justice strong institutions

In this range of SDGs that received such a low score, SDGs 4 and 5 were selected to work on. It is clear that they cannot all be addressed at the same time, and these two (SDG 4 and SDG 5) are considered to be likely to obtain a great improvement with specific actions and are also closely related to university activity in general.

However, it is observed that only objective 9 obtains a score above 4—Goal 9: industry, innovation and infrastructure. Two other SDGs closely related to it, and which may be closely related to the area of business organization (the field of the subject in which this work is carried out), also received a low rating, close to 3, despite being very related to SDG 9 and with contents taught in business organization subjects. These are specifically Goal 8: decent work and economic growth and Goal 10: reduced inequality.

Therefore, it was decided to initially work on these 4 SDGs (4, 5, 8 and 10) to propose teaching–learning actions that can improve the knowledge and perception of students, as well as their opinion regarding the contribution that the exercise of their future profession can have in the achievement of the SDGs.

After this preliminary analysis, the following section details the results of the implementation of the activities proposed in phase 2.

4.2. Results of the Proposed Teaching–Learning Activities

The activities designed in the previous stage were implemented using the proposed survey and the defined guidelines for each one. The details of these performed activities and their direct results are shown in the next sections.

4.2.1. SDG 4—Quality Education

Below are the results of the implementation of each of the activities and the implication that each of them may have in the development of this SDG in the professional future of the study participants.

Study on the Determining Factors to Maintain a Quality Education in Intensive Online Format Environments

The interviews with the study participants provided many common results in terms of their concerns and value propositions. The students interviewed believe in the following quality factors of education nowadays:

- The continuous monitoring of student progress, through continuous evaluation processes and periodic tutorial services.
- Encouraging the active participation of students in class, with dynamic and participatory sessions, both face-to-face and online (in the case of online sessions, the use of the video camera by all participants is considered decisive).
- A good balance and complementarity between face-to-face sessions and online sessions.
- The adaptation of training materials and monitoring (and evaluation) systems to the teaching format (face-to-face vs. online).
- The use of interactive tools, such as discussions, debates, group dynamics and games, in order to encourage participation and improve content assimilation and learning itself.
- The use of seminars given by external professionals with recognized prestige, providing their personal and professional vision of the thematic contents and with an eminently practical approach.
- The control of the workload, as a way to put learning ahead of student assessment.
- Increase the link between the university (as the last step before the professional stage) and the business world, so that teaching is consistent with the demands and needs of employers and society itself.

Thus, it becomes clear that the students are committed to the use of all available means so that every effort is put into learning in which the student has a leading role, participates actively and uses all the means available to the educational environment so that the teaching is of quality and useful for their imminent arrival in the world of work.

Practical Example on how to Plan and Develop a Participatory Group Dynamic through an Online Platform

After carrying out the proposed activity, the following results were obtained:

- Most of the participants believe that the result was better than expected, with the activity having achieved greater dynamism than it would have if no accelerators had been introduced.
- All the participants confirm that sharing information prior to the session helped students to participate more actively.
- Almost all the participants consider that the greatest motivation to participate actively was to see the rest of the participants be active.

These results suggest that the use of accelerators in carrying out group dynamics can be critical for their success as a learning activity in the educational environment, even more so if they are carried out online where participants tend to “hide” behind from the camera and remain more inactive.

Use of Seminars Given by Prestigious Professionals for Improving the Sense of Usefulness of the Teaching Received

After putting into practice the holding of seminars by external professionals and with the conditions set out in the previous sections, the students showed a more than general acceptance that this initiative has been productive, effective and valuable for obtaining a quality education. It is therefore one of the factors that this study can propose as key in achieving SDG 4 “Quality education”. Specifically, the participants in the study proposed the following factors that they consider key to the success of this type of initiative:

- Be very careful in choosing the professional and the content of the speech to ensure that it is directly related to the training curriculum.
- Carefully plan the temporary space and the time in which each seminar will be delivered.
- Choose professionals from different backgrounds and from different ways of thinking, so that students can choose for themselves which is the most appropriate message for their way of behaving as future professionals.

The general conclusion is therefore that it is confirmed that, with certain parameters, this initiative has valued a way in which students can contribute great value during the development of their professional career, simply by attending seminars by recognized professionals and promoting similar initiatives, all this as a source of inspiration to accelerate SDG 4 “quality education”.

4.2.2. SDG 5—Gender Equality

Carrying out the proposed activity among the participants in the selected population sample shows that the empowerment of women has been effectively valued in a society where (according to the participants) they can and should develop key professions for the common good of a sustainable environment.

Specifically, the following results have been obtained:

- It was widely believed that if the gender of any of the roles had been changed (man for woman and vice versa), the list of salvation priorities would not have changed. The roles represented by women were considered valuable not only for their reproductive capacity, but also for their value in themselves, which indicates that the characters were valued for their value as professionals regardless of their gender. Therefore, in this exercise women were not discriminated against for the fact of being so, being a clear example of women’s empowerment.
- The only changes in the list that the participants proposed as relevant in case significant results are expected are related to the age of the roles, but not to their gender, which again indicates that there was no discrimination in any case to women for the fact of being. This group of individuals therefore does not show any negative bias towards the role of women; on the contrary, they are very happy seeing women in priority places.

- Women who occupy key professions in society (doctor, biologist, artist, etc.) were, without any of the participants showing that gender was a trigger for it.

The general result of the activity has been, as intended, to make students aware of their role in reducing gender inequalities. Despite the fact that it has turned out to be a group with an excellent capacity for innate acceptance of gender equality, their awareness has been increased of active factors of persecution and the battle against the factors of gender inequality that they may find in their future professional environments.

4.2.3. SDG 8—Decent Work and Economic Growth

With the performance of the proposed practical activity among the chosen sample group, two successful management models (according to the chosen speakers) of motivation and diversity have been obtained, both related to digital humanism. The key factors for each of these two models have been highlighted as the following:

- Model 1:
 - Communication;
 - Participation;
 - Consistency and coherence;
 - Commitment and motivation.
- Model 2:
 - Trust;
 - Belonging and community;
 - Team;
 - Emotionality.

The key factors detected being different, the general conclusion is that all of them are compatible and highly desirable, with all of them being highly related to employee commitment, the emotional link to the company and colleagues, and personal motivation.

The participants in the study, after carrying out the activity, proposed as determinants in their future professional work for the achievement of SDG 8 the promotion of the following:

- Trust in the organization and its members;
- Empathy across the board;
- Horizontal and vertical communication.

It is therefore considered that this activity has achieved that the students, by themselves and after a presentation and debate, have detected success factors for this SDG through the development of their professional future. It is hoped that this will help students to effectively develop their future professional work in line with achieving SDG 8.

4.2.4. SDG 10—Reduce Inequality

The proposed activity to promote SDG 10 “Reduce inequality between countries”, carried out within the sample population of this study, provided the following results:

- If the exercise is carried out without the proposed accelerators, the result of the game is as expected: the developed countries get richer, the underdeveloped countries get poorer and depending on the ability of the emerging countries they are placed more or less close to the developed countries or the underdeveloped (without reaching either one or the other); this causes an inertia that means that the structure of wealth and international markets will not vary with a high probability over the years.
- If the proposed accelerators are used, it is shown that underdeveloped countries can reduce the inequality gap between them and rich countries.
- The students were surprised when they verified the value of certain tools for reducing inequalities, such as the provision of valuable information, tools, technology, etc., which are capable of “bringing closer” the wealth-producing capacity of underdeveloped countries to the more powerful countries capacity.

- The students were also surprised when they saw how hard it is to break inertia and the incentive that the most powerful countries have to prevent underdeveloped countries from reaching a better level of development.

The final conclusion of the implementation of this exercise has brought the students to the conviction that breaking the current inertia of international markets and favoring a reduction in inequalities leads to a situation of greater balance in which the overall result is best for all (both developed and underdeveloped countries) in which all countries win (a win–win result for the game). It is therefore an activity that can be key for the participating students to develop their creative and productive capacities in their professional future in an attempt to reduce inequalities between those who have more and those who have less.

4.3. Global Results from the Research

As a global result of the performed research, it can be stated that the students who participated in the study have improved their knowledge of the SDGs, as well as their awareness of them. They are also clearer about the contribution they can make, both personally and through the development of their future profession, towards the achievement of the SDGs.

Therefore, the proposed and implemented activities can be presented as specific results of the work, which allow students to improve in terms of all of this. These activities are specifically focused on SDGs 4, 5, 8 and 10, but they also influence knowledge, awareness and the perceived relationship with professional performance of the rest of the SDGs, since all of them are closely related and all the SDGs are integrated and consistent.

5. Discussion and Conclusions

The key takeaways of this study are that, regardless of the region, culture, etc., of the population where this study is replicated, it seems reasonable and expected to obtain similar conclusions, with almost certain variations in the SDGs selected in phase 1 but with encouraging results also on the knowledge and impact that these types of activities can have on the present and the future of these students.

The proposed and implemented activities have been developed within the scope of SDGs 4, 5, 8 and 10, although it can be assumed (and this has been demonstrated within the results obtained) that these activities have influenced global knowledge and global commitment to the 17 SDGs, both in the field of their personal and professional impact capacities. Therefore, after scrupulously deploying each of the phases of the methodology presented in this paper, the following conclusions can be drawn.

Firstly, it can be affirmed that the results obtained from the surveys regarding the knowledge that students have about the SDGs are positive, and most of the students (60%) obtained a grade between acceptable and good in their knowledge regarding the SDGs.

Curiously, the real existing knowledge on the part of the students is greater than the knowledge they believe they have. This may be because they have learned about the SDGs without really being very aware of it and have knowledge about the subject without really knowing that they know it.

However, it is also true that the difficulty of the questions that make up the survey must be considered. In this regard, it could be said that the questions posed were issues that can be considered relatively “easy”, given that, on other occasions, similar works had obtained quite bad results and more complex questions were not wanted.

Regarding awareness, it can also be said that the result is quite satisfactory, since almost 50% of the students have a good awareness of the SDGs, and 40% have an acceptable degree of awareness. In other words, more than 90% of the students (including the 7.27% who have an excellent awareness) have an undoubtedly positive degree of awareness towards the SDGs.

Therefore, the results in terms of these aspects (knowledge and awareness) of the analysis are much more than satisfactory. Possibly, this is due to the fact that there are already enough activities that are being carried out to promote the SDGs and to make

university students aware of them, which is a good indicator of the work that is being carried out, both from the university and at the level of society in general.

However, the degree to which university students believe that their future profession can contribute to achieving the SDGs is quite low, particularly in some specific SDGs.

This may be due to the fact that the information on the SDGs is transmitted at a generic level, in relation to the involvement of the general public but not particularized for each professional profile and the possibilities of influence that it may have in relation to the performance of your work.

Therefore, in this work, after identifying this circumstance, the teaching–learning activities described in the methodology are proposed, and their implementation and results have been presented in the Section 4.

As explained, these activities help students to further develop their knowledge and awareness of the SDGs, specifically SDGs 4, 5, 8 and 10. However, they also have a somewhat different focus than other activities carried out in the environment of society in general. An approach should be made towards the relationship of the application and development of the same that may exist from their professional field, especially focused from the point of business organization (the subjects in which the activities have been launched).

Therefore, it can be said that the main objective that was proposed at the beginning of the investigation has been achieved, which was to design teaching–learning activities appropriate to the situation and level of knowledge of university students, so that they can be put into practice in an integrated way with the contents of the subjects of engineering studies and, in this way, train students in the SDGs and how they can help to achieve them.

With a view to future research, it is suggested that researchers delve into the dichotomy between knowledge and motivation about the SDGs, between the awareness of the impact that can be had on them and the real force that can be exerted on them, all this considering that the environments in which the studies are carried out may vary, but that in essence the university population seems to share a series of principles that are common to them due to their age, the decision about their innovative capacity and their academic background.

As the main limitation, the population sample that has been used in this research is limited to some students of the Polytechnic University of Valencia, with different profiles. The results cannot then be extrapolated to the general population, either academic or non-academic groups of people. Other more general limitations come from the fact that society in general, and the academic one in particular, constantly advance and change, both due to technological advances and the changes in values that events induce in our behaviors, so the moment of study can be crucial in the results and conclusions that are obtained.

For this reason, it is proposed that future lines of research bring this research to other environments, starting with other universities and cities in Spain. Subsequently, it is proposed to extend the research to other countries, both in Europe and on other continents.

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