Investigating university students' self-perception of their influence on the SDGs

Investigación de la autopercepción del estudiantado universitario sobre su influencia en los ODS

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ABSTRACT. Education is essential in achieving many Sustainable Development Goals (SDGs). We have surveyed the students of 17 university degrees on the SDGs in two Spanish universities, to better adjust to their concerns, preferences and needs and to discover their omissions and shortfalls. Students expressed their opinions from two perspectives: that of citizenship and that of the degree they are studying, identifying the goals to which they feel they can contribute. Results show a very high self-perception in their ability to contribute to the SDGs, with significant differences depending on the degree. The goals that students consider themselves most able to influence are gender equality, good health, peace, justice, and quality education. Many of them coincide with degrees related to the SDGs themselves, but others do not. The degrees in the ICT field have the lowest self-perceived knowledge about SDGs.

RESUMEN. La educación es esencial en la consecución de muchos Objetivos de Desarrollo Sostenible (ODS). Hemos encuestado al estudiantado de 17 titulaciones universitarias sobre los ODS en dos universidades españolas, para ajustar mejor la docencia a sus inquietudes, preferencias y necesidades y para descubrir sus carencias. El alumnado expresó sus opiniones desde dos perspectivas: la de la ciudadanía y la de la titulación que estudian, identificando los objetivos a los que creen que pueden contribuir. Los resultados muestran una autopercepción muy alta en su capacidad para contribuir a los ODS, con diferencias significativas según la titulación. Los objetivos en los que el estudiantado se considera más capaz de influir son: la igualdad, salud, paz y educación de calidad. Muchos de ellos coinciden con titulaciones relacionadas con los propios ODS, pero otras no. Las titulaciones del campo de las TIC son las que tienen un menor conocimiento autopercibido sobre los ODS.

KEYWORDS: Sustainability, University, SDGs, Gender, Quality.

PALABRAS CLAVE: Sostenibilidad, Universidad, ODS, Género, Calidad.

1. Introduction

The 2030 Agenda for Sustainable Development was approved in 2015 by the United Nations (United Nations, 2015). This Agenda aims   at improving the lives of the people who inhabit this planet. To this end, 17 Sustainable Development Goals (SDGs) were established. Some of the SDGs include the elimination of poverty, quality education, gender equality, decent work, the reduction of inequalities, climate action, responsible production and consumption, peace, or the defense of ecosystems.

Spanish university professors have the obligation to contribute to the knowledge and development of Human Rights, democratic principles, the principles of equality between women and men, solidarity, environmental protection, universal accessibility and design for all, and the promotion of the culture of peace, as marked by the Royal Decree 1393/2007, of October 29, that established the organization of official university education in Spain since last year, as well as its upgrade, the Royal Decree 822/2021. Therefore, the guiding principles of those Royal Decrees largely coincide with the SDGs of the 2030 Agenda. Despite the good words of the law, compliance with these provisions in university practice does not seem to be what it should be. This is the case, for example, of the equality between women and men, which coincides with SDG 5. This happens despite having specific regulations that require incorporating the gender dimension in university teaching (Verge & Cabruja, 2017). For instance, in something as basic as using inclusive language in the university teaching guides, only 2% use non-sexist language (Fundació Isonomia, 2020). This indicates that there is a lot of room for improvement. In the university faculty, gender roles continue to be very present: Spanish women university professors dedicate on average 30 hours a week more to care than their male counterparts in the range of 35 to 40 years, which is the most frequent parenting period (Cabero & Epifanio, 2021).

Another of the most relevant SDGs for the university community is SDG4, which aims to "ensure inclusive and equitable quality education and promote lifelong learning opportunities for all". Deficiencies or weaknesses have also been found, as a structural and recurrent problem, in approaches to education on equity issues (Marginson, 2011). Inequality affects many education systems and in many cases education itself is part of the structure that feeds back into inequalities (Tang & Dang, 2022), and not only from an economic perspective. For example, Pitman, Brett & Ellis (2021) states that modern university institutions are designed to function best with "compartmentalised definitions, static identities and universal disclosure", thus not facilitating differences, so "people with disability are subjected to both cultural and economic injustices, which causes tension in how students are supported, both by high-level policy and institutional practice". That is why social justice and equity in higher education is an important issue for the scientific community and its research (Wilson-Strydom, 2015).

There are works that analyze the theoretical knowledge that students have about the SDGs, both at the university level (Lull et al., 2021), and in secondary school (Ochando, Vilches & García, 2021). However, although in this work there is a question about their knowledge, here we focus on the perception that students have about the SDGs, about their opinion on their contribution both from their degree and from the citizen perspective. In Zamora-Polo, Sánchez-Martín, Corrales-Serrano & Espejo-Antúnez (2019), a very broad questionnaire of 65 questions was analyzed, among which they asked about the relationship of their profession and individual with each of the SDGs on a Likert scale of 1 to 5, in three grades: degree in Physiotherapy, degree in Mechanical Engineering and degree in Primary Education. In our case, the number of questions was much smaller (8 questions), since very long surveys can have an impact on an increase in non-answers or inaccurate answers. On the other hand, our survey moved to a wider range of degrees, as will be detailed later. Other works are focused on a specific degree, Tourism, such as (Mínguez, Martínez-Hernández & Yubero, 2021; Slocum, Dimitrov & Webb, 2019). Therefore, this work differs from previous work.

Our objective, in addition, was to know the initial perception of the students about the SDGs, to implement the integration of the SDGs in a more exhaustive way in our teaching in statistics and mathematics mainly, and thus to know the previous receptivity of the students, the form will allow us to observe their doubts,

deficiencies and priorities in the typology of SDGs to be worked on.

2. Methodology

2.1. Questionnaire

A questionnaire created with the Google Forms platform was passed in April and May 2022. It was passed to the students of the subjects of the Jaume I University (UJI) and Valencia University (UV) in Spain, in which we taught. Most of them are subjects of statistics. The degrees belong to diverse fields such as Engineering, Health, Social Sciences and Humanities. The students of the second semester with face-to-face classes (we also teach in distance degrees) were informed in person during the classes and were left 5 minutes to respond, if they wished, in the laboratory classes that have a computer. While the students with distance classes and or those with classes in the first semester, were informed by a message by the virtual classroom. Answering the anonymous questionnaire was voluntary and was not included in the assessment of the subject. A total of 194 people responded to the survey: Bachelor's Degree in Medicine (BDM) at UJI (34); Bachelor's Degree in Industrial Design and Product Development Engineering (BDIDPDE) at UJI (29); Bachelor's Degree in Computational Mathematics (BDCM) at UJI (24); University Master's Degree in Applied Research in Feminist, Gender and Citizenship Studies (UMDARFGCS) at UJI (9); Bachelor's Degree in Electrical Engineering (BDEE) and Bachelor's Degree in Industrial Technology Engineering (BDITE) at UJI (9); Bachelor's Degree in Business Administration (BDBA), Bachelor's Degree in Economics (BDE) and Bachelor's Degree in Finance and Accounting (BDFA) at UJI (9); Bachelor's Degree in Building Engineering (BDBE) at UJI (7); Bachelor's Degree in Preschool Education (BDPEUV) at UV (6); University Master's Degree in Educational Psychology (UMDEP) at UJI (6); Bachelor's Degree in Video Game Design and Development (BDVGDD) at UJI (6); University Master's Degree in Computational Mathematics (UMDCM) at UJI (5); Bachelor's Degree in Public Management and Administration (BDPMA) at UJI (4); Bachelor's Degree in Tourism (BDT) at UJI (1); Bachelor's Degree in Primary Education (BDPEUJI) at UJI (45). We have joined some degrees because they are of similar academic profile, in fact they taught the statistics subject together. In fact, in some cases, our statistics subjects are shared in these degrees.

Regarding gender, 122 people identified with the female gender (the majority, since it represents 63% of the answers), 69 with the male gender and 3 people as "non-binary" gender.

The questionnaire consisted of the following 8 questions. All of them were mandatory, they could not be left blank.

• The 2030 Agenda integrates 17 sustainable development goals, which were adopted in 2015. Do you know which organism approved it? It had the following possible answers: UN; European Union; Government of Spain; I don't know; Other: free response.
• Rate from 0 to 10 your knowledge about the SDGs (being 0, not knowing anything, and 10 knowing a lot). (An image about SDGs appeared).
• Do you think that you can contribute to any of the SDGs with what you are studying in your degree? Yes; No. In the affirmative, case:
• To which SDGs do you think you can contribute from your degree? (You can select multiple SDGs).
• Do you think that as a citizen you can contribute to any of the SDGs? In the affirmative case:
• To which SDGs do you think you can contribute from the citizenship? (You can select multiple SDGs).
• What degree are you studying?
• What gender do you identify with? The possible answers were: Female; Male; Other: free response.

2.2. Limitations

The main limitation is that the selection of the sample of students was not random. It was a convenience sample, and the participating students were self-selected, so it is a voluntary response sample. This can lead to bias. Therefore, we cannot use inferential statistics. Our study is strictly exploratory, and we only use

descriptive statistics. However, note that our questionnaire does not address a controversial topic, such as substance abuse or sexual behavior, where people may want to hide bad behaviors, and where the impact of bias from non-response could be really important (Cheung, Peter, Smit, Vries & Pieterse, 2017). Non-response bias is not determined by the response rate, but by the reasons for non-participation. A low response rate does not necessarily indicate a non-response bias (Choung et al., 2013). In fact, Menachemi (2011) assessed response bias in a web survey at a university faculty and suggested that response bias was undetectable. Despite the limitations, this study offers an approximation about the opinion of the students on the SDGs, which can guide us for their integration into teaching.

3. Results

Figure 1 shows the answers to the question about which organism approved the 2030 Agenda. These were distributed, as follows: "I don't know" was the majority answer (53%), whereas 37% knew that it was the UN. Note that 11% thought they were other organisms (7% the European Union, 4% the Government of Spain and 0.5% the World Economic Forum).
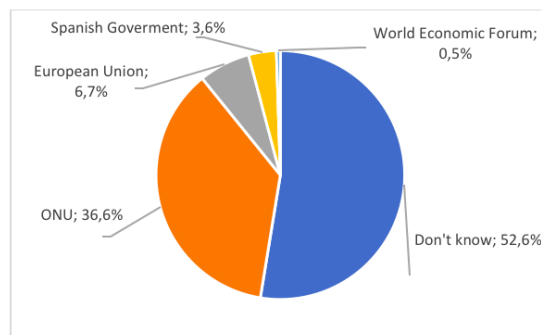

Figure 1. Answers to which organism approved the 2030 Agenda. Source: Self-made.

Regarding the self-perception of knowledge about the SDGs, the mean responses were 4.37, with a standard deviation of 2.63. 37% of people surveyed think they know less than or equal to 3; the median is 5; 76% think they know less than or equal to 6, while 91% think they know less than or equal to 7. Only 4% self-assessed as an excellent (9 or more) on their perceived knowledge of the SDGs. Remember that it is not a measure based on the result of a test, but it is a completely subjective self-assessment. In short, in general, it seems that they think they do not have good knowledge about the SDGs.

Table 1 shows the means, standard deviations, and coefficients of variation of the self-perceived knowledge by degree, together with the accuracy of the answer to which organism approved Agenda 2030.

Degree	Mean	SD	CV	Success
BDM	5.4	2.2	0.4	50%
BDIDPDE	3.7	2.6	0.7	31%
BDCM	3.2	2.9	0.9	33%
UMDARFGCS	6.1	1.9	0.3	67%
BDEE and BDITE	3.8	1.6	0.4	22%
BDBA, BDE and BDFA	4.2	3.2	0.8	0%
BDBE	3.6	2.5	0.7	29%
BDPEUV	6.5	1	0.2	83%
UMDEP	5.7	2.3	0.4	60%
BDVGDD	3.2	2.8	0.9	17%
UMDCM	2.8	3.6	1.3	60%
BDPMA	4.3	2.9	0.7	25%
BDT	7	-		100%
BDPEUJI	4.4	2.5	0.6	29%
Total	4.3	2.6	0.6	36%

Table 1. Means, standard deviations (sd) and coeffients of variation (cv) of self-perceived knowledge by degree, as well as percentage of success to the first question of the survey. Source: Self-made.

If we analyze the data in Table 1, grouped by areas of knowledge, the greater self-perceived knowledge about the SDGs is in humanistic degrees, such as the degree in BDPEUV, UMDEP and UMDARFGCS, with averages around 6 and small standard deviations, compared to other degrees, although the BDPEUJI only shows an average of 4.4. Then, we find the BDM, from the Health area, with an average of 5.4 and a small standard deviation. Next, we find the degrees in the area of Economics, with an average of 4.2, although with high standard deviation, which indicates that there is great variation within the responses of these degrees. Finally, the lowest average scores are given in engineering degrees. Although within them, two groups can be seen: BDIDPDE and BDBE, with averages over 3.7 on the one hand, and on the other hand, we find the computational degrees, such as the BDCM, BDVGDD and UMDCM, with averages of 3.2, 3.2 and 2.8, respectively, although with very high standard deviations. This standard deviation indicates that there is a group of students with a very low self-perception and another with a very high self-perception, surely a sign of the disparity of interest in the SDGs in these grades as opposed to the other bachelors where interest seems to be a majority. This is corroborated by the CV values, which for these degrees are greater than one or almost one.

If we analyze the results by gender, we find that women have a higher self-perceived knowledge of the SDGs than men. Specifically, women score 4.59 on average and men 3.89. Non-binary people get an average of 6, but we only have three people in the sample, so this is not a significant result.

Note that the previous sorting coincides with the degree of feminization and masculinization of the degrees according to the reports on students of the Equality Unit of the UJI (https://www.uji.es/serveis/ui/base/arxiu/docs/informes/igualtat-xifres/). The degrees of BDPEUV, UMDEP and UMDARFGCS, have a very high percentage of women enrolled, above 90%. The degree in Medicine and BDPEUJI is also feminized, with female enrollments of around 70%. The degrees in the area of Economics are more equal, with enrollments around 50%. In contrast, engineering degrees are more masculinized, although with exceptions. For example, the percentage of female enrollment is around 45% in the BDIDPDE, BDBE and BDCM. But the degrees of BDIDPDE, BDEE, BDVGDD and UMDCM have very low percentages of women enrolled, such as 19%, 9%, 15% and 10%.

Of course, as we have said, these were self-assessments and in the same Table 1 we can see the success rates to the first question, about which organism approved the 2030 Agenda. The percentages of success were high in the humanistic degrees, beyond 60%, except for BDPEUJI which has a low percentage, namely 29%. It was also high in the UMDCM (60%). In BDM the success rate was 50%. The success was around 30% in the BDIDPDE, BDBE and BDCM, but fell to 20% in the BDIDPDE, BDEE and BDVGDD. The most remarkable thing is that in the Economics degrees, there was no success, and in the BDPMA, the success was 25% (that is, only one person of the 4 who responded in this career was right). As can be seen, in the case of economics degrees there seems to be a gap between self-perception and real knowledge, although obviously we have only been able to control it with a question.

We highlight that the overwhelming majority answered affirmatively to the question "Do you think that you can contribute to any of the SDGs with your degree?" and to the question "Do you think that you can contribute to any of the SDGs as a citizen?", being 96% and 97%, respectively. This implies that university students perceive themselves as potential contributors. This attitude can be very helpful in the integration of the SDGs in the subjects since according to Seifert (2004) students who feel capable, are more self-regulated, more strategic and metacognitive, and show adaptive and mastery behaviours.

Let us analyze which SDGs they think that can contribute from their degree. For ADEF degrees (BDBA, BDE and BDFA)), the most voted goal with 89% is SDG8, while the two least voted goals (with no votes) are SDG14 and SDG15. For the BDBE, SDG9 is the most voted; in this degree all the SDGs have received at least one vote, being the least voted, with one vote SDG2, SDG5, SDG13, SDG16 and SDG17. For the BDVGDD, the most voted are SDG3, SDG4 and SDG5 with 67%. While SDG1, SDG2, SDG6, SDG7, SDG11 and SDG17 have not received any votes. In BDPMA, SDG17 is the one that has received the most votes, with 75%, SDG6 and SDG9 have not received any. For the BDIDPDE, SDG9 has been the most voted with 83%, where SDG2

has not received any votes. For the BDMC it has been seen that SDG8 has been the most voted with 75% and the least voted SDG2 with 12%. In BDM, it has been seen that SDG3 has received 97% of the votes, while SDG7, SDG9 and SDG7, have only received 6%. SDG5 has received 100% of the votes for BDPEUV and for the UMDARFGCS. Also, SDG4 has received 100% of the votes in BDPEUV, where SDG1, SDG2, SDG6, SDG7, SDG8, SDG9, SDG17, have not received any votes. Similarly, in BDPEUJI the most voted objective is SDG4 (91%) which focuses on education (it is logical because they are future primary school teachers) followed by SDG5 (80%), SDG3 (71%) and SDG16 (64%), on the other hand, the least voted objectives were SDG9 (2%), SDG2 (6%), SDG7 (9%), SDG6 (11%) and SDG1 (13%). For the UMDCM it is observed that SDG8 is the most voted with 60%, for UMDEP SDG4 and SDG5 have the highest score with 83%, and in TIE degrees (BDEE and BDITE) it is SDG7 that receives the vote of all participants. In general, the most voted goal has been SDG5 with 55% and SDG4 with 54% of the votes among all degrees, while the least voted goal with only 9% of the votes has been SDG2.

For the case where they are asked what SDGs they can contribute from the citizenship, it is observed that in ADEF, SDG5 is the most voted with 88.9% of the votes. SDG17 being the least voted with 0 votes. For the BDBE, SDG11 and SDG17 are the most voted with 86% of the votes, a percentage similar to that received by SDG14 for the BDVGDD. In both degrees, all SDGs have received at least one vote. For BDPMA it is observed that SDG5 and SDG13 are the most voted with 75%, while SDG6 has not received any votes. In BDIDPDE SDG16 and SDG5 received 65% of the vote. Following this line, SDG5 is the most voted for BDCM, BDM, BDPEUV, UMDEP and TIE with 75%, 88%, 83%, 83% and 44% of the votes, respectively. However, in BDPEUV, SDG13, 14 and 15 received the same vote as SDG5 and SDG16 in UMDEP. Regarding BDPEUJI, the most voted objectives were SDG5 (75%), SDG16 (73%) and again education SDG4 (66%). As regards to UMDARFGCS, SDG16 received 100% of the votes and the rest of the goals received at least one vote. The most voted goals for UMDCM, with 60%, correspond to SDGs 11, 13, 14; none of them coincide with the most voted goals for the BDCM. In general, the most voted goal has been SDG5 with 74% of the votes among all degrees, while the least voted goal has been SDG9 and SDG17, with only 14% and 15% of the votes respectively.

4. Discussion and conclusions

Due to the importance of working on the SDGs in tertiary education, in this paper we have analyzed the perception about the SDGs of the students of our degrees, as a previous work to the more extensive integration of the SDGs in our subjects. An on-line survey has been carried out in various degrees. The degrees belong to different fields and almost all belong to the UJI. The limitations of the results of this survey are discussed at work.

Based on the descriptive analysis of the results, we have detected that only 37% know that the UN was the organism that approved the 2030 Agenda (first question of the survey). The self-perception of knowledge about the SDGs varies according to the degrees, although in general it is low. The mean (with ratings between 0 and 10) was 4.37. The highest self-assessments occur in humanistic degrees, where they got the highest percentage of correct answers for the first question (except BDPEUJI). The lowest self-assessments occur in engineering degrees and coincide with low percentages of success to the first question. In Medicine the ratings and percentages of success are about 5 and 50%, respectively. In the economics degrees, the perceptions are close to the global average (4.2 on average), but on the other hand, nobody responded to the first question correctly.

As a very positive point, about 96% think that both from their degree and from the citizenship they can contribute to the SDGs.

As explained above, the data were collected from two perspectives: degree, and citizenship (Figure 2). It was expected that the self-perceptions in both perspectives would be different as they belong to completely different experiential fields, but they coincided in the SDGs with the highest and lowest choices. The most

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significant differences were found in SDG11, SDG13 and SDG14 (Sustainable cities and communities, Climate action and Life below water respectively), where they considered that they would have a greater influence as citizens than as future professionals. On the other hand, in SDG8 and SDG9 (Decent work and economic growth and Industry, Innovation and Infrastructure respectively) they consider that they will be more influential from a career perspective. These answers seem quite logical as these SDGs seem to be more related to their future working paths.
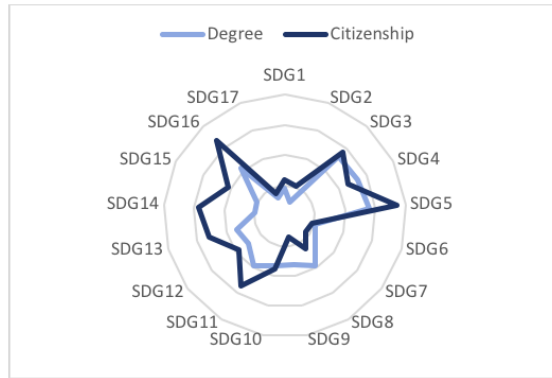
Figure 2. Voting percentages for each SDG according to degree and citizenship. Source: Self-made.

The goals to which students feel they can contribute the most, from their degrees or from their citizenship, are SDG5 (gender equality), SDG3 (good health and well-being), SDG16 (peace, justice and strong institutions) and SDG4 (quality education), and the least, SDG1 (no poverty), SDG2 (zero hunger), SDG6 (sanitation and clean water) and SDG17 (Partnerships). The most considered ones coincide with the predictable affinities of medicine, psychology, and teaching degrees, but the possible influence of engineering on the goals of affordable and clean energy (SDG7), Industry, Innovation and Infrastructure (SDG9), Sustainable cities and communities (SDG11) or economics in Decent work and economic growth (SDG8), which as we had already indicated had their own consideration towards the minor SDGs, has not been shown.

If we add the gender variable to the analysis, we obtain two very different graphs. On the one hand, as regards the percentages of votes for the different SDGs, focusing on the citizens' perspective (Figure 3), we obtain very similar results for both genders, although an increase in SDG5 (Gender equality) stands out among women, which shows a greater sensitivity on the part of women to the issue of gender equality.
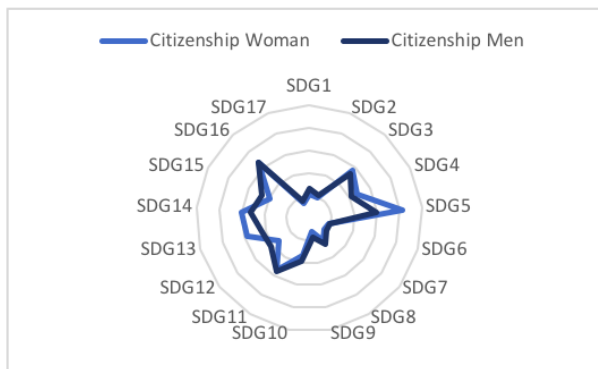

Figure 3. Voting percentages for each SDG according to citizenship and gender. Source: Self-made.

On the other hand, if we analyze by gender the percentage of votes of the different SDGs from the perspective of degree (Figure 4), the two trends shown by the genders are very disparate. The percentage of men's votes outweighs that of women, especially in SDG9 (Industry, Innovation and Infrastructure) and that of women stands out in SDG5 (gender equality), SDG4 (quality education) and SDG16 (Peace, justice and strong institutions). These results, to some extent, show that the stereotypical profiles between women and men are

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maintained, with the male tendency being more focused on technical skills and the female tendency being more socially sensitive. This tendency may be a reflection of the challenging gender STEM gap in the degrees of our universities (Calvo-Iglesias, Epifanio, Estrade & Mas de les Valls, 2022; García-Holgado, Verdugo-Castro, González, Sánchez-Gómez & García-Peñalvo, 2020).
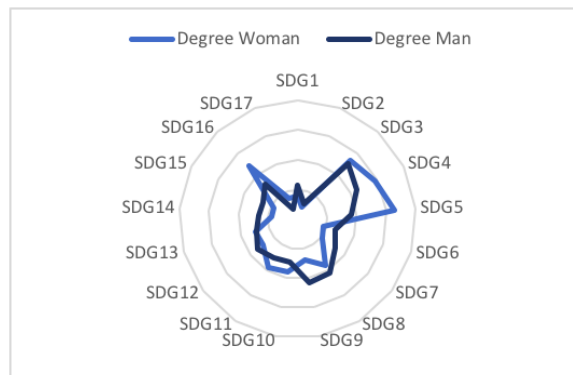

Figure 4. Voting percentages for each SDG according to degree and gender. Source: Self-made.

In future academic years, it is intended to integrate the SDGs more comprehensively in our teaching, which is especially in statistics. In the field of mathematics and statistics the following references can help: Epifanio, 2022, García-Planas, Taberna-Torres & Rina-García, 2018, Vidal, 2021, the papers of the special edition of PRIMUS on Mathematics for Social Justice (Buell & Shulman, 2019) or the resources of the Radical Statistics Group (using statistics to support social change), such as Ridgway & Ridgway (2019). Also inspiring is the work of Calvo-Iglesias (2022). After integration, the work carried out could be evaluated with a questionnaire (in Sánchez (2018) it is shown for computer science degrees). Fernández-Olit, Mañas-Alcón & Aranda-Cuéllar (2022) reviews the barriers and incentives found by teachers to integrate the SDGs in the classroom.

We would like to be able to extend this work with a larger sample of students, across degrees and universities, and even across countries, to verify if similar results appear and to design more efficiently the implementation of the SDGs in the academic curriculum. Note that the involvement of the different universities is not the same and can have a great impact on the integration of the SDGs in the classes (Castro, Zanello, Lizcano & Daza, 2022).

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