Research Article https://doi.org/10.12973/eu-jer.14.1.537

European Journal of Educational Research
Volume 14, Issue 2, 537 - 548.
ISSN: 2165-8714
https://www.eu-jer.com/

Evaluating Student Knowledge, Performance, and Satisfaction with the Integration of the Sustainable Development Goals into a First-Year Social Education Methodology Course

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Received: September 27, 2024 ▪ Revised: November 14, 2024 ▪ Accepted: December 2, 2024

Abstract: To ensure a sustainable future, it is important to align educational practices with global sustainability goals. This study examines the impact of integrating the United Nations' Sustainable Development Goals (SDGs) into a first-year social education methodology course. Using a survey of 70 students, the relationships between students' knowledge of the SDGs, their academic performance, and their satisfaction with the integration of the SDGs into their course curriculum were analysed. Findings indicated a significant correlation between enhanced understanding of the SDGs and improved academic performance. The incorporation of the SDGs into the course received somewhat mixed evaluations, however, with most students reporting high overall satisfaction but identifying specific aspects as in need of improvement. Despite this, a greater increase in knowledge of the SDGs by the end of the course appeared to enhance students' overall satisfaction with the teaching project. These outcomes emphasise the complexity of embedding sustainability in higher education, suggesting that while direct academic improvements may be subtle, cultivating knowledge of the SDGs is pivotal for fostering better educational outcomes and greater student satisfaction. Future research should consider longitudinal and qualitative studies to further explore these dynamics and provide deeper insights into the long-term effects and experiential aspects of integrating the SDGs into university education.

Keywords: *Academic performance, knowledge, satisfaction, social education students, sustainable development goals.*

To cite this article: Surname, X., & Falgueras-Riu, J. (2025). Evaluating student knowledge, performance, and satisfaction with the integration of the sustainable development goals into a first-year social education methodology Course. *European Journal of Educational Research*, *14*(2), 537-548. https://doi.org/10.12973/eu-jer.14.2.537

Introduction

The United Nations' Sustainable Development Goals (SDGs) have universal significance, as evidenced by the global mandate for their fulfillment across all countries and regions, regardless of local, sustainable development levels. Spain, like other United Nations (UN) member states, has committed to the 2030 Agenda and its seventeen SDGs. Incorporating the SDGs across various fields of knowledge is a continuous and transdisciplinary process that encourages engagement with the environment and future generations, fostering active citizenship in relation to socio-environmental issues (Gallardo-López & García-Lázaro, 2021).

Universities, with their roles in teaching, research, and knowledge transfer, hold significant potential for driving social transformation and have a heightened responsibility for addressing major global challenges and promoting sustainability (Alonso & Alcaraz, 2019; Leiva-Brondo et al., 2022; McCowan, 2023; Purcell et al., 2019). Embedding relevant competencies into course syllabi can accelerate progress towards sustainability by fostering a mindset that raises students' awareness of ethical, social, and environmental issues, thereby significantly impacting the community (Cachero et al., 2023; Elmassri et al., 2023). Such initiatives can enhance students' key competencies for sustainability, as defined by the United Nations Educational, Scientific and Cultural Organization (UNESCO, 2017), motivating them to adopt and actively promote sustainable action and behaviours.

Despite the global mandate and political commitment, there are several gaps in current university curricula regarding the integration of sustainability and the SDGs. Social education programmes, which focus on training agents of change committed to improving individual well-being and meeting the socio-educational needs of contemporary societies, provide an ideal platform for incorporating sustainability and the SDGs into their curricula (Gallardo-López & García-Lázaro, 2021; Purcell et al., 2019). These programmes typically focus on equipping students with the knowledge, skills,

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and values necessary to promote community engagement and social change. They often include courses on social justice, community development, and ethical practices, aiming to prepare students to critically address contemporary social challenges (Pérez, 2021).

In higher education, social education programmes offer a blend of theoretical and practical learning experiences. They emphasise critical thinking, problem-solving, and the application of social theories to real-world situations (Pérez, 2021). By integrating the SDGs into their curricula, these programmes aim to foster a deeper understanding of global issues and encourage students to contribute positively to society. However, previous studies highlight a lack of comprehensive integration of these concepts, underscoring the importance of a more structured approach to embedding sustainability into course syllabi.

Recent studies have found that although SDGs are scarcely incorporated into social education curricula, small educational interventions in this regard significantly enhance students' sustainability knowledge (Vancea & Contreras-Higuera, 2024; Vancea et al., 2024). Alba et al. (2020) also identified deficiencies in current social education degree curricula regarding sustainability and the inclusion of the SDGs, highlighting the need to update social educator training with the 16 UNESCO sustainability competencies. Similarly, Muñoz-Rodríguez et al. (2020) evaluated four sustainability competencies defined in 2011 by the Conference of Rectors of Spanish Universities across various bachelor's degrees in education: critical contextualization of knowledge, sustainable use of resources, participation in community processes, and application of ethical principles. They concluded that social education students do not seem to achieve a significant improvement in these competencies by the end of their studies.

Existing research also suggests the necessity of cross-curricular integration of sustainability concepts across all degrees and fields of study (Alonso & Alcaraz, 2019; Leiva-Brondo et al., 2022; McCowan, 2023; Purcell et al., 2019). However, there is a lack of practical examples and assessments of how this integration can be effectively implemented and evaluated in social education programmes. Additionally, there is limited empirical research on the specific impacts of integrating the SDGs into university courses, particularly in social education (Alba et al., 2020; Muñoz-Rodríguez et al., 2020). This study aims to fill these gaps by examining the impact of integrating the SDGs into university curricula on students' knowledge, academic performance, and overall course satisfaction.

The main objective of this article is to determine whether incorporating the SDGs into a first-year methodology course in social education enhances students' knowledge of sustainability and positively impacts their academic performance and overall satisfaction with the course. Training in research methodology helps students understand the importance of research in addressing contemporary social challenges. Through this training, students develop competencies to investigate these challenges critically and effectively, including designing and conducting research, analysing data rigorously, and communicating results clearly. Additionally, students are encouraged to adopt values, attitudes, and civic habits aligned with sustainability and social responsibility. Ultimately, this approach equips students to contribute significantly to a more sustainable and equitable society through their research and professional practice.

Evaluating the impact on academic performance helps determine whether integrating the SDGs enhances students' learning outcomes by providing insights into whether students are not only gaining knowledge about sustainability but also applying it effectively in their academic work. Improved performance can indicate that the curriculum changes are beneficial and support deeper learning. Additionally, measuring students' satisfaction with the course after incorporating the SDGs helps understand their engagement and motivation. High satisfaction levels can suggest that students find the content relevant and meaningful, leading to better retention of knowledge and a more positive attitude towards sustainability. It also helps identify areas for improvement in course design and teaching.

The main research questions of the study are:

- How does incorporating the SDGs into a first-year social education methodology course impact students' knowledge of sustainability?
- What are the effects of integrating the SDGs on students' academic performance?
- How does the inclusion of the SDGs in course syllabus influence students' overall satisfaction with the course?

Incorporating the SDGs Into a First-Year Methodology Course in Social Education

Different approaches can be taken to integrate a socially relevant topic like sustainability into university curricula. These approaches include incorporating environmental issues into existing subjects, developing separate courses, integrating the concept into every subject, or offering specialisations within the faculty's programmes (Lozano et al., 2017). Curricula can be improved by considering the structure of the programmes, the interdisciplinary nature of the topic, potential partnerships with other institutions and communities, its practical orientation, links to research work, and the competency levels of faculty members and their assessment processes (Maruna, 2019).

The approach adopted at the University of Barcelona (UB) to integrate sustainability and the SDGs into a first-year methodology course in social education involved introducing these concepts as a source of reflection and inspiration to subsequently formulate and implement a research topic of interest. The main assumption was that social educators are

particularly well-suited to addressing the education and awareness of citizens on issues of sustainability and social responsibility.

The teaching project incorporating the SDGs was carried out in parallel in two groups on a first-year methodology course in social education during the second semester of the 2022-2023 academic year. The 6 ECTS credit course, titled "Research and Evaluation in the Socio-Educational Field", included two thematic blocks:

1. Bibliographic research: This block covered an introduction to scientific research, fundamentals of conducting bibliographic research, accessing and using main databases, bibliographic references and citations, and reflection from a gender perspective.
2. Processes of data collection and analysis. This block focused on survey and interview techniques, observation, information analysis techniques, and critical reflection.

The course thus focused on the basic aspects of scientific research in social education, including literature review, concept definition and operationalisation, design and implementation of qualitative and quantitative research techniques, and data analysis for both quantitative and qualitative methods.

The course syllabus initially included three learning objectives: understanding the fundamentals of bibliographic research and its applicability for scientific investigation; understanding, developing, and using data collection strategies; and acquiring basic skills in data analysis and interpretation. By incorporating the SDGs into this methodology course, the main teaching objective was to promote sustainability and social responsibility by equipping undergraduates with the necessary research knowledge and skills to examine and address global challenges. Throughout the course, the role of instructors was instrumental in providing the knowledge, skills, and guidance necessary for students to successfully engage in socio-educational research and develop competencies related to sustainability and social responsibility.

Students freely formulated their research topic and questions related to one of the seventeen SDGs. To facilitate this, a matrix with the seventeen SDGs (rows) and different areas of socio-educational action (columns) was designed. Once the topic had been formulated and validated, students individually conducted a literature review on the topic and developed the analytical framework. This part resulted in the first individual evaluation (Ev1).

Next, students formed groups of four to six people to decide on a group research topic based on the individual topics. They designed data collection instruments (questionnaire and semi-structured interview guide), applied these instruments to a specific population, collected data, and analysed them using the data analysis methods previously learned (content and statistical analysis). These activities were assessed through a group assignment (Ev2).

Finally, a student survey was conducted at the end of the teaching project to assess students' knowledge, performance, and satisfaction with the incorporation of the SDGs into the methodology course.

Methodology

Study Design

This study employs a survey-based research design to evaluate the integration of the Sustainable Development Goals (SDGs) into a first-year methodology course in social education. The primary objectives are to assess students' knowledge of the SDGs following their incorporation into the course and to examine the impact on students' academic performance and overall satisfaction with the course.

The survey is part of a broader initiative aimed at developing a teaching project by integrating sustainability into an undergraduate methodology course within the Social Education degree programme. The rationale behind this project is to equip social education students with the knowledge and skills to understand and apply principles of sustainability in their future professional practice and research.

Sample and Data Collection

Student samples are often employed in educational research because students are frequently the primary subjects of these studies and are readily accessible to university faculty and researchers. The data for this study were collected via an online survey during the second semester of the 2022-2023 academic year. The survey was administered in class, with students given direct access to the survey link and QR code. Questionnaires were made available in both Spanish and Catalan, reflecting the languages of instruction at the University of Barcelona (UB). Participation in the survey was voluntary, and measures were taken to ensure informed consent and the anonymity of participants, with these protocols communicated clearly to respondents and in accordance with the UB's Code of Ethics for Integrity and Good Practices (Universitat de Barcelona. Comitè d'Ètica, 2019).

The online survey was administered at the end of the teaching project to two groups of undergraduate students (a universe of N=110) enrolled in the compulsory 6 ECTS methodology course, titled "Research and Evaluation in the Socio-Educational Field". Ultimately, empirical evidence was gathered from a sample of 70 students. Participants' ages ranged

from 18 to 26, reflecting the undergraduate student population, and their gender distribution was predominantly female (86%), with only 7 male respondents (10%) and 2 non-binary (4%).

The questionnaire was designed to measure students' knowledge and perceptions regarding the incorporation of the SDGs at the beginning and end of the course and to explore students' academic performance and satisfaction with the teaching project. Evaluating the impact of integrating the SDGs on academic performance and student satisfaction helps determine if students are effectively gaining and applying sustainability knowledge while also providing insights into their engagement, motivation, and areas for improvement in course design.

To achieve these objectives, the questionnaire was based on Leiva-Brondo et al.'s (2022) study on the awareness and perception of the SDGs among university students with various STEM degrees. It included three parts of Leiva-Brondo et al.'s (2022) validated questionnaire, and an additional fourth part on overall satisfaction with the course:

- Part 1. Consent, Demography, SDGs awareness, and Sources of Information (Q1 to Q11, plus Q28).
- Part 2. Sustainability literacy (10 of the original 12 items) (Q12 to Q21).
- Part 3. Perceptions of the SDGs (Q22 to Q25).
- Part 4. Satisfaction with the teaching project (Q26, Q27, Q29 and Q30).

In this article, we focus on the improvement of students' knowledge of the SDGs by the end of the course, and its impact on students' academic performance and overall satisfaction with the course. Thus, we included only the questions related to these aspects in the analysis.

To measure students' awareness and perception of the SDGs at the beginning and end of the teaching project, we incorporated two specific questions on the extent of their familiarity with the SDGs both prior to and at the conclusion of the course:

- Q10: "How well did you know the SDGs before starting the course? and
- Q28: "How well do you know the SDGs now?".

To measure student satisfaction with the teaching project, we included the following questions:

- Q27. "To what extent do you agree with the following statements about your educational experience?"
  a. It required a lot of effort.
  b. It was hard to connect the SDGs to specific socio-educational problems.
  c. The pedagogical applicability of the SDGs in a methodology course was not clear.
  d. The individual coursework on the SDGs contributed to a better understanding of global challenges
  e. The usefulness of working with the SDGs in the Social Education Degree was not clear.
  f. Group work with the SDGs was a positive experience.
  g. There were difficulties in communicating with teachers.

- Q29. "Rate your level of satisfaction with the incorporation of the SDGs in the course" (1 to 10 scale, where 1 is very low and 10 is very high)

To measure students' academic performance by the end of the course, we used two evaluations: the mid-term individual evaluation (Ev1, scored out of 10), and the end-of-term group-based evaluation (Ev2, scored out of 10). The individual evaluation involved a literature review and an operationalisation assignment related to a selected research topic based on one SDG. The group-based evaluation required students to design and implement two data collection techniques (one quantitative and one qualitative), followed by the corresponding data analysis and interpretation.

Data Analysis

The data analysis was conducted using IBM SPSS Statistics software. Prior to analysis, a thorough data cleaning process was performed to ensure the integrity and accuracy of the dataset. This process confirmed that there were no missing values or duplicates within the 70-respondent sample. Additionally, no inconsistent values or unwanted outliers were identified for the variables of interest.

Following data cleaning, descriptive statistics were calculated to summarise and visualise the data, providing an overview of students' knowledge, performance and satisfaction. A nonparametric correlation analysis was then conducted to examine the relationship between students' knowledge of the SDGs and their academic performance by the end of the course.

Independent samples t-tests were finally performed to compare the means of different groups (*e.g.*, students with increased vs. not increased SDG knowledge) to determine if there were significant differences in satisfaction with the teaching project at the end of the course. Inspection of Q-Q Plots confirmed the normal distribution of the data, ensuring the validity of the t-test results. Additionally, Levene's test verified the homogeneity of variances.

Results

Initially, a cross-tabulation analysis was carried out to assess changes in students' knowledge of the SDGs and the corresponding differences in their grades, from the mid-term individual evaluation (Ev1) to the end-of-term group-based evaluation (Ev2). Subsequently, a correlation analysis was performed to determine the statistical significance of differences in SDG knowledge and academic performance by the end of the course. We hypothesised that improved SDG knowledge would lead to enhanced academic performance.

To measure the differences in students' knowledge of the SDGs by the end of the course, we compared their initial level of awareness (Q10: "How well did you know the SDGs before starting the course?") with their final level (Q28: "How well do you know the SDGs now?"). Numerical values were assigned to responses for both Q10 and Q28 (1 = "I didn't/don't know them"; 2 = "I knew/know them only by name"; 3 = "I knew/know them well") and the difference (Q28-Q10) was calculated to account for the evolution of SDG knowledge. The resulting values of the *Difference Knowledge* variable ranged from -1 (a decrease in knowledge), 0 (no change), to 1 and 2 (an increase in knowledge).

To evaluate changes in academic performance, we compared grades from the mid-term individual evaluation (Ev1, scored out of 10) to the end-of-term group-based evaluation (Ev2, scored out of 10). We created the variable *Difference Grades* (Ev2 – Ev1) to reflect the grade change. A dummy variable, *Dummy Difference Grades,* was created where a value of 1 indicated an increase in grades from Ev1 to Ev2. This approach enabled further investigation of the correlation between improved SDG knowledge and enhanced academic performance.

To assess students' overall satisfaction with the integration of the SDGs into the course, two questions were used: Q27 consisted of seven items (Q27a to Q27g), with responses ranging from 1 (totally agree) to 5 (totally disagree); Q29 asked students to rate their satisfaction with the incorporation of the SDGs into the methodology course on a scale from 1 (very low) to 10 (very high). Initially, a mean-based analysis was performed on the seven items in Q27, providing a general overview of the majority opinions. Subsequently, frequency tables were created for all seven items in Q27, offering detailed information on response distribution. Finally, a descriptive statistical analysis of Q29 was performed, followed by an examination of the frequency distribution for each numeric response to Q29.

To accurately study the growth in students' knowledge of the SDGs and its relationship with overall satisfaction, we created the dummy variable *Dummy Difference Knowledge* by assigning a value of 1 to those who achieved considerable enhancement (a score of 2 in Q28 – Q10). A value of 0 was assigned to all other scores (1, 0, or –1). This dummy variable was used in an independent samples t-test to evaluate satisfaction levels according to increased SDG knowledge. We hypothesised that a greater increase in SDG knowledge would lead to higher student satisfaction with the new teaching approach.

Knowledge of the SDGs and Academic Performance

The cross-tabulation analysis, which assessed changes in students' knowledge of the SDGs by the end of the course (*Difference Knowledge*) and the corresponding differences in their grades (*Difference Grades*), yielded valuable insights (Table 1). On examining the marginal values for *Difference Knowledge*, it was observed that 72.86% (51 of the 70 students) enhanced their knowledge of the SDGs by the end of the course.

Students who significantly raised their awareness of the SDGs, advancing two levels, showed a marked trend towards grade improvement. Specifically, 78.57% of these students improved grades from Ev1 to Ev2. In other words, those who moved from "I didn't know them" at the beginning of the course (Q10) to "I know them well" at the end (Q28) constituted the group with the highest proportion of grade enhancement between the two evaluations.

Moreover, among all students who improved their knowledge of the SDGs –by either 1 or 2 levels– a majority of 68.63% displayed grade improvements from Ev1 to Ev2. In contrast, those who reported no increase in knowledge, maintaining or decreasing by one level, predominantly experienced a decline in grades (52.63%).

Table 1. Crosstabulation Difference Knowledge and Dummy Difference Grades

		Dummy Difference Grades		
		(0)	**Positive (1)**	**Total**
2	Count	6	22	28
	% within Difference Knowledge	21.43%	78.57%	100.00%
1	Count	10	13	23
	% within Difference Knowledge	43.48%	56.52%	100.00%
0	Count	9	8	17
	% within Difference Knowledge	52.94%	47.06%	100.00%
-1	Count	1	1	2
	% within Difference Knowledge	50.00%	50.00%	100.00%
Total	Count	26	44	70
	% within Difference Knowledge	37.14%	62.86%	100.00%

When examining the relationship between students' increased knowledge of the SDGs and changes in their academic performance by the end of the course, we found a significant Spearman's rho nonparametric correlation at the 5% significance level (Table 2). Specifically, increased SDG knowledge positively impacted grade improvement from the mid-term to the end-of-term assessments. In essence, students who saw a positive change in their grades had experienced an increase in their understanding of the SDGs by the end of the course.

Table 2. Correlation Between Difference Knowledge and Dummy Difference Grades

Variables		Difference Knowledge	Dummy Difference Grades
Difference Knowledge	Spearman's rho Correlation	1	.270*
	Sig. (2-tailed)		.024
	N	70	70
Dummy Difference Grades	Spearman's rho Correlation	.270*	1
	Sig. (2-tailed)	.024	
	N	70	70

* Correlation is significant at the .05 level (1-tailed)

Satisfaction with the Course

Table 3 summarises students' opinions on various aspects of the incorporation of the SDGs into the methodology course. Students provided responses on a scale ranging from 1 (totally agree) to 5 (totally disagree).

The mean values in Table 3 show that the teaching approach did not require significant effort (Q27a) and generally did not pose substantial difficulty in connecting the SDGs to specific socio-educational problems (Q27b). However, the pedagogical applicability of the SDGs to the course (Q27c) was not fully grasped, and the usefulness of working with the SDGs in social education (Q27e) remained unclear. Neither group nor individual work with the SDGs were perceived as positive or helpful experiences (Q27f, Q27d). Additionally, there were some communication issues with teachers (Q27g).

Table 3. Descriptive Statistics of Q27 on a Scale from 1 (Totally Agree) to 5 (Totally Disagree)

Q27 items	N	Mean	Std. Deviation	Range	Min	Max
27a. [It required a lot of effort]	70	3.89	0.753	3	2	5
27b. [It was hard to connect the SDGs to specific socio-educational problems]	70	2.81	1.219	4	1	5
27c. [The pedagogical applicability of the SDGs in a methodology course was not clear]	70	2.56	1.150	4	1	5
27d. [The individual coursework on the SDGs contributed to a better understanding of global challenges]	70	3.90	0.935	4	1	5
27e. [The usefulness of working with the SDGs in the Social Education Degree was not clear]	70	1.80	0.987	4	1	5
27f. [Group work with the SDGs was a positive experience]	70	4.01	0.985	3	2	5
27g. [There were difficulties in communicating with teachers]	70	2.40	1.095	4	1	5

The frequency distribution of each Q27 item clearly indicates the majority opinions (Table 4). For most students, incorporating the SDGs into the course curriculum did not require a significant effort. Only 2.86% somewhat agreed it required a lot of effort, while over 70% disagreed. However, some difficulties were noted. Approximately 42.85% of students agreed that relating the SDGs to socio-educational problems was challenging, while 30% disagreed. Additionally, 55.72% reported difficulties communicating with teachers (Q27g).

On the other hand, 51.43% of respondents agreed that the pedagogical applicability of the SDGs to a methodology course was unclear, while only 17.14% disagreed. This suggests there is room for improvement in understanding how the SDGs can be effectively integrated into methodology courses. Additionally, a significant 78.57% of participants stated that the utility of integrating the SDGs into a social education degree was not clear, while only 7.14% disagreed with this, thus highlighting the need for clearer communication and practical demonstrations of how the SDGs can enhance social education programmes.

Lastly, the findings related to students' experiences with individual and group work involving the SDGs yielded similar results. These two items, Q27d and Q27f, unlike the other five, were articulated in a positive manner, so the meanings of responses from 1 to 5 must be interpreted in reverse. Approximately 74.28% of students somewhat disagreed with the assertion that individual work with the SDGs contributed to a better understanding of global challenges. This suggests that there may be room for improvement in designing individual assignments related to the SDGs to enhance students'

comprehension of global issues. Regarding group work, 70% of students did not find it positive in the context of the SDGs, while only 8.57% agreed that it was helpful. This highlights the need to reconsider how group activities are structured and facilitated to maximise their impact on SDG learning outcomes.

Table 4. Frequencies Distribution Q27a - Q27g

		Level of agreement from 1 (totally agree) to 5 (totally disagree)						
Q27 items		**1**	**2**	**3**	**4**	**5**	**Total**	**Average**
Q27a (-)	Count	0	2	18	36	14	70	3.89
	%	0.00%	2.86%	25.71%	51.43%	20.00%	100%	
Q27b (-)	Count	11	19	19	14	7	70	2.81
	%	15.71%	27.14%	27.14%	20.00%	10.00%	100%	
Q27c (-)	Count	13	23	22	6	6	70	2.56
	%	18.57%	32.86%	31.43%	8.57%	8.57%	100%	
Q27d (+)	Count	2	3	13	34	18	70	3.90
	%	2.86%	4.29%	18.57%	48.57%	25.71%	100%	
Q27e (-)	Count	35	20	10	4	1	70	1.80
	%	50.00%	28.57%	14.29%	5.71%	1.43%	100%	
Q27f (+)	Count	0	6	15	21	28	70	4.01
	%	0.00%	8.57%	21.43%	30.00%	40.00%	100%	
Q27g (-)	Count	17	22	19	10	2	70	2.40
	%	24.29%	31.43%	27.14%	14.29%	2.86%	100%	

(-) Negative formulation
(+) Positive formulation

When assessing students' satisfaction with the incorporation of the SDGs into the methodology course on a scale of 1 to 10 (Q29), a significant 80% of respondents rated this in the high range of 7 to 10. Notably, the mean satisfaction score was a high 7.49 (Table 5).

Table 5. Descriptive Statistics Q29. Level of Satisfaction with the Incorporation of the SDGs into the Course

Descriptive Statistics Q29		**Values**
N	Valid	70
	Missing	0
Mean		7.49
Std. Error of Mean		0.183
Median		8.00
Mode		8
Std. Deviation		1.530
Variance		2.340
Range		7
Minimum		3
Maximum		10
Sum		524
Percentiles	25	7.00
	50	8.00
	75	8.00

The distribution of responses on student satisfaction with the SDG-enriching teaching (Q29) reveals two key insights. Firstly, not a single student rated their satisfaction below 3, and only 4.29% (three students) below 5. Secondly, a substantial majority (80%) expressed high satisfaction, with ratings between 7 and 10. Notably, a significant 57.14% of students rated their satisfaction as 8, 9, or 10 (Figure 1).

These findings indicate that a considerable segment of the student body was genuinely happy with the integration of the SDGs into the course curriculum. However, these findings somewhat contradict the previous results regarding satisfaction with specific aspects of the teaching, suggesting that while overall satisfaction was high, there may be particular areas that need improvement.

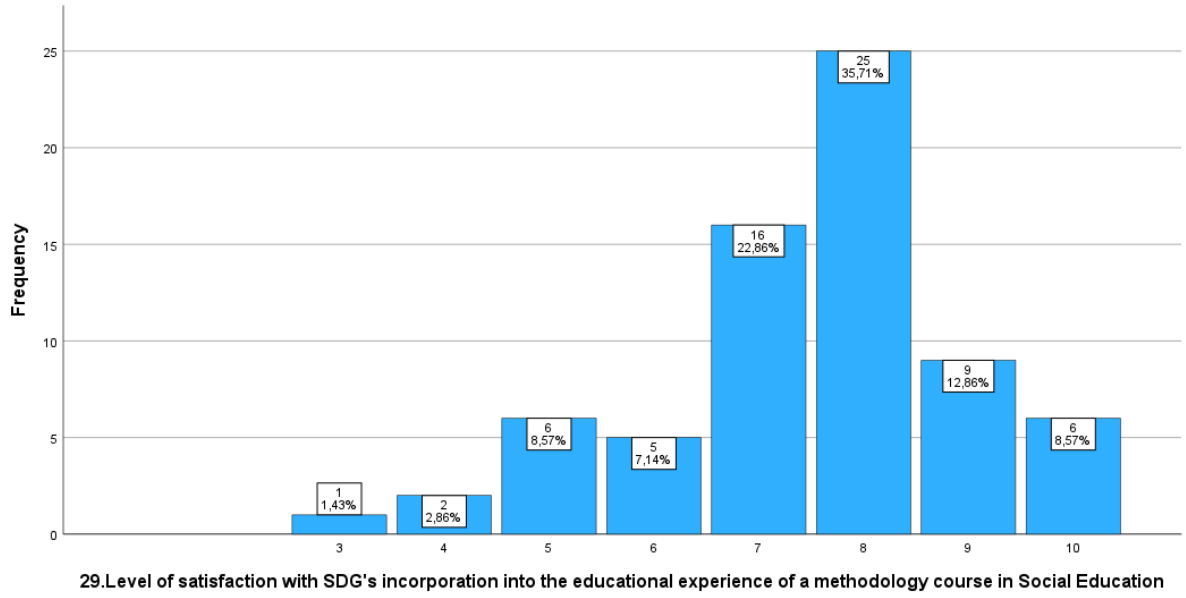

Figure 1. Level of Satisfaction With the Incorporation of the SDGs Into the Course

Knowledge of the SDGs and Overall Course Satisfaction

Finally, to accurately assess the increase in students' knowledge of the SDGs by the end of the course and its relationship with their overall satisfaction with the teaching project, we used the dummy variable *Dummy Difference Knowledge* in an independent samples t-test with a 95% confidence interval. This test evaluates students' satisfaction levels based on their increased SDG knowledge (*e.g.*, students with highly increased vs. not highly increased SDG knowledge) (Table 6).

We observed significant mean differences at the 5% significance level between the two groups, assuming equal variances. The group that experienced a considerable increase in SDG knowledge by the end of the course (*i.e.*, those who went from "I don't know them" to "I know them well") reported significantly higher satisfaction with the incorporation of the SDGs into the methodology course compared to the other group, with a difference of 0.738 (95% CI, 0.009 to 1.467). The effect size for the difference between the groups was calculated using Cohen's d, resulting in a medium effect value of 0.493.

This result indicates that a substantial increase in SDG knowledge positively affects student satisfaction with the course. Therefore, it highlights the importance of comprehensive learning for the successful and lasting integration of the SDGs into university curricula.

Table 6. Independent Samples t-Test on Q29 by Dummy Difference Knowledge.

t-test for Equality of Means							
29. Level of satisfaction with the incorporation of the SDGs							
Significant Contrast		**N**	**Mean**	**SD**	***t*-stat**	**One-Sided *p***	**Effect size**
Improvement in SDG knowledge by the end of the course	Great improvement (2)	28	7.93	1.303	$t = 2.021$	.024	0.493
	Not great improvement (-1, 0, 1)	42	7.19	1.612			

Discussion

This study enhances our understanding of how integrating the Sustainable Development Goals (SDGs) into social education degree programmes impacts student outcomes. Specifically, it examines the effects on student knowledge, academic performance, and overall satisfaction. Previous research has highlighted the transformative potential of social education programmes in promoting social change and sustainability (Alba et al., 2020; Gallardo-López & García-Lázaro, 2021; Vancea & Contreras-Higuera, 2024). However, despite this potential, the representation of the SDGs within these curricula remains limited (Alba et al., 2020; Muñoz-Rodríguez et al., 2020; Vancea et al., 2024).

To analyse the relationship between student knowledge, performance, and satisfaction concerning the integration of the SDGs into a first-year social education methodology course, we first assessed the relationship between changes in SDG knowledge by the end of the course and differences in academic grades. We then examined students' satisfaction with the incorporation of the SDGs into the course curriculum. Lastly, we explored how the increase in SDG knowledge by the end of the course was associated with students' overall satisfaction with the teaching project. The study surveyed a sample of first-year social education students enrolled in a methodology course. Our rationale for this choice lies in the

belief that social education students should be aware of the SDGs and capable of integrating them into their vocational and research endeavors from the outset of their degree.

Knowledge of the SDGs and Academic Performance

Building on previous findings (Cachero et al., 2023; Muñoz-Rodríguez et al., 2020), which indicate a generally limited understanding of sustainability and the SDGs among Spanish university students, our study strategically focused on differences in SDG knowledge and academic performance by the end of the course. This analytical approach revealed a direct correlation between increased knowledge of the SDGs and improved academic performance.

The integration of the SDGs into the curriculum aligns with the broader educational mandate to raise students' awareness of ethical, social, and environmental issues (Cachero et al., 2023; Elmassri et al., 2023). By embedding relevant competencies like social responsibility into course syllabi, universities can significantly impact the community and accelerate progress towards sustainability. This approach not only enhances students' theoretical understanding but also equips them with practical skills for addressing contemporary social challenges.

Our findings indicate that students who gained a deeper understanding of the SDGs were better able to apply this knowledge in their academic work, leading to higher grades. This underscores the importance of integrating sustainability education into university curricula, as it prepares students to navigate and contribute to a sustainable future. The positive impact on academic performance highlights the twofold benefits of universities' efforts in driving social transformation through teaching, research, and knowledge transfer (Alonso & Alcaraz, 2019; Leiva-Brondo et al., 2022; McCowan, 2023; Purcell et al., 2019).

Student Satisfaction with the Course

Existing research underscores the necessity of integrating sustainability concepts across all degrees and fields of study (Alonso & Alcaraz, 2019; Leiva-Brondo et al., 2022; McCowan, 2023; Purcell et al., 2019), yet practical examples and assessments of effective implementation in social education programmes remain scarce. A significant proportion of respondents in this study reported high satisfaction levels with the integration of the SDGs into their coursework, indicating a generally positive perception of the teaching. This result validates the instructors' decision to incorporate the SDGs into the course. However, some deficiencies were noted, particularly in relating the SDGs to socio-educational problems and the clarity of their pedagogical applicability to a methodology course.

The overall satisfaction of students with the incorporation of the SDGs into their course coincides with prior research findings (Cachero et al., 2023; Elmassri et al., 2023). However, these studies also highlight a gap between curriculum integration and the actual development of competencies for sustainability. While students positively value the presence of SDG-related content, translating this content into tangible skills and heightened awareness remains an area needing further development. This suggests that while inclusion in curricula is a positive step, it should be coupled with pedagogical approaches that more effectively cultivate the required awareness and competencies for real-world sustainability challenges.

Knowledge of the SDGs and Overall Course Satisfaction

Our analysis revealed a positive correlation between a significant increase in SDG knowledge (a score of 2 in Q28 – Q10) and higher levels of overall student satisfaction by the end of the course. This suggests that students who gained a deeper understanding of the SDGs felt more satisfied with their learning experience. These findings imply that enhancing students' knowledge of the SDGs not only contributes to their academic success but also positively impacts their perception of the course.

Therefore, while the incorporation of the SDGs into social education syllabi may enhance knowledge acquisition, it may also lead to better academic results and higher student satisfaction. However, other factors beyond the integration of the SDGs, such as teaching methods and the structural design of courses, may also significantly influence student achievements and satisfaction. Moreover, there is a pressing need to prioritise the development of specific competencies for sustainability, as stated by UNESCO (2017). Attention to these competencies is essential for equipping students with the skills necessary to navigate and contribute effectively to a sustainable future.

Conclusions

To conclude, the integration of the Sustainable Development Goals (SDGs) into a first-year methodology course in social education not only boosted students' comprehension of the SDGs but also led to notable improvements in their academic achievement and satisfaction. The enriched curriculum, which included SDG-focused content such as the seventeen goals with their specific meanings, achievements, and limitations, resulted in a marked increase in SDG awareness and a rise in student grades and satisfaction with the teaching project.

While the integration of the SDGs into the course received a generally positive evaluation, some aspects were identified as needing further improvement. Specifically, there is a need to better relate the SDGs to socio-educational problems and

clarify their pedagogical applicability within the course. Addressing these aspects can enhance the overall effectiveness of SDG integration. This synergy of enhanced understanding, improved academic results, and greater satisfaction underscores the potential benefits of integrating the SDGs into educational frameworks more extensively and thoughtfully. By doing so, educational institutions can ensure that students not only learn about the SDGs but also understand how to apply them in real-world contexts, as well as in research and professional work.

The findings highlight the importance of embedding SDGs into educational curricula to foster a deeper understanding of sustainability issues among students. To maximise these benefits, it is crucial to integrate the goals more broadly, consistently, and conscientiously across all educational programmes. This approach will enhance students' academic and personal development and equip them with the necessary sills to address sustainability challenges. Emphasising social responsibility in research and professional practices is essential for preparing students to contribute meaningfully to a sustainable future.

Recommendations

Given the students' high satisfaction with the presence of SDG-related content in their course, along with the significant positive correlation between enhanced knowledge of the SDGs and improved student performance and satisfaction, it would be reasonable to advocate greater translation of this content into heightened awareness and tangible sustainability competencies through higher education curricula. To achieve this, it is important to consider other factors beyond the incorporation of the SDGs, such as teaching methods and the structural design of courses, which may also significantly influence student knowledge, skills, satisfaction, and achievements. However, it should be noted that these factors were not studied in this research.

Furthermore, to gain deeper insight into the long-term effects and intricate dynamics of integrating the SDGs into higher education, further studies are needed. Future research should consider conducting longitudinal studies to track students' progress in sustainability education, academic performance, and satisfaction over multiple semesters or academic years and across different degrees. Additionally, in-depth qualitative assessments are necessary to better capture the impact and detailed perspectives of both students and educators on the incorporation of the SDGs into academic syllabi.

Educators play a crucial role in this process and should continue to incorporate the SDGs into their teaching practices. By doing so, they can help foster a deeper understanding and commitment to sustainability among students, equipping them with the necessary skills and awareness to address real-world challenges. Continuous professional development and support for educators are essential to ensure they are sufficiently prepared to integrate the SDGs effectively into their courses.

Limitations

The empirical results obtained in this study have several limitations. Firstly, the small sample size, with only 70 first-year social education students responding out of a total population of 110. This incomplete participation likely impacts the data collected, the statistical analyses, and the possibility of generalising findings. Additionally, the sample was not entirely representative of undergraduate methodology courses in the social education degree programme, as only first-year students were included. These features of the small sample may have generated biases for false positive findings or relations, which is why only statistically significant correlations have been included.

Secondly, we relied on self-reported data, which can be influenced by various biases, including social desirability, recall, and response biases. These biases may have led participants to provide inaccurate or subjective responses. However, we did not include measures to mitigate such distortions, nor did we explore counterfactual or control variables. The absence of a control group affected our ability to definitively attribute observed improvements in students' outcomes and satisfaction solely to the integration of the SDGs.

Moreover, the study is limited by a lack of robust instruments for measuring students' knowledge and perceptions of sustainability and the SDGs, in addition to the absence of a coherent theoretical framework. For example, there are various definitions of sustainability education and competencies. Therefore, developing a consistent instrument to measure and compare these aspects will be important for future research.

Despite these limitations, our findings contribute to a deeper understanding of sustainability education and provide insights into the relationship between students' knowledge of the SDGs and their academic performance and satisfaction with their incorporation into the course syllabus. Further studies with larger datasets should be conducted to expand upon these findings.

Ethics statement

This study involving human participants was reviewed and approved by the University of Barcelona. Participants provided their written informed consent to participate in the study.

Acknowledgements

We would like to extend our gratitude to the teachers in the Faculty of Education at the University of Barcelona, especially those teaching methodology on the social education degree. We would also like to thank Williams Contreras-Higuera for his assistance in the initial data collection.

Conflict of Interest

The authors declare no conflict of interest.

Funding

This study received no external funding.

Generative AI Statement

As the authors of this work, we used the AI Copilot tool for the purpose of enhancing language work and eliminating semantic errors. After using this AI tool, we reviewed and verified the final version of our work. We, as the authors, take full responsibility for the content of our published work.

Authorship Contribution Statement

Vancea: Conceptualisation, methodology, validation, formal analysis, writing, review, editing and final approval. Falgueras-Riu: Methodology, formal analysis, data curation, editing, and review.

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