Sostenibilidad e internacionalización como pilares de vanguardia educativa

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CASE STUDIES AS A PEDAGOGICAL TOOL FOR INTEGRATING THE COMPETENCIES AND LEARNING OBJECTIVES RELATED TO THE SUSTAINABLE DEVELOPMENT GOALS INTO EDUCATIONAL SYLLABUSES

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1. INTRODUCTION

The main international organizations agree that we are now at a critical point in time as regards ensuring a sustainable future for our planet. We must act quickly and firmly to address the sustainability challenges that we are currently facing. In this scenario, education is an absolutely essential tool -and indeed an end in itself- given that real enduring change in society can only be achieved through the right form of education. Educators at all levels have long experience in social change (Anderson, 2010), which today more than ever must be applied in the field of Education for Sustainable Development (ESD).

However, according to a report from UNESCO (2021), around 25% of teachers do not feel prepared to teach topics relating to the Sustainable Development Goals (SDGs) such as Climate Change, Sustainable Production and Consumption, Human Rights and Gender Equality, Cultural Diversity and Tolerance, etc. It is therefore crucial that we continue working on innovative pedagogical approaches which, within the field of Education for Sustainable Development (ESD), can bring to our classrooms the key skills and learning objectives necessary to accomplish the SDGs. This must happen sooner rather than later.

An ambitious approach in this direction, on which insufficient work has been done in secondary and further education, is Case Studies. This is

an active learning methodology in which the students investigate a real problem, so as to acquire the base for an inductive study (Boehrer & Linsky, 1990). This method is centred more on the students' learning process than on the teacher or the teaching, although the teacher also plays an important part in the whole process (Donoso-Vázquez, 2014). One of the many possible definitions of case studies defines them as a "complete and intensive analysis of a fact, problem or real event with the purpose of finding out about it, interpreting it, resolving it, creating hypotheses, checking data, reflecting, completing knowledge, making diagnoses and on occasions training oneself in the possible alternative solution procedures" (De Miguel, 2005).

The case study method has the following main characteristics (UPM, 2008):

- Encouraging students to work first of all individually, and then later to share and compare their ideas with their classmates, both in small groups and with the whole class, under the constant guidance of the teacher.

- It is based on real cases similar to those that the students may encounter in their future professional activity, which increases their motivation and their interest in the topic being studied, so improving their self-esteem and self-confidence.

- It centres on the students' ability to reason and their capacity to structure the problem and the work to enable them to reach a solution. There is no one right answer, which means that the process is more important than the final result. The important thing is that they are prepared to cooperate and to converse, so as to reach consensuses and joint decisions.

- Using this technique requires much more effort and dedication than other more traditional methods on the part of both the teacher and the students.

- However, the learning outcomes are more significant, emphasizing the role of the student as the key player in their own learning and increasing their commitment to it.

Due to these characteristics, the method has a number of benefits of which Asopa & Beye (2001) highlight the following:

- Acquisition of knowledge. The method requires some prior knowledge, which the students must update, interpret and put into the real context of the situation they are studying, all of which will require an additional effort on their part. It is often also necessary for them to search for new information from very diverse sources.

- Skills development. The method encourages to a high degree the development of very diverse skills and abilities, such as for example work on the cross-cutting skills established by the European Higher Education Area (Donoso-Vázquez, 2014). Another interesting aspect is that it helps students to identify in which situations certain particular skills may (or may not) be applied. In other words, it helps them to apply these skills and abilities more effectively.

- Formation of attitude and values. The discussion method used in the case study, particularly when working in small groups, exposes students to different ways of viewing the same situation, so helping them re-examine their own attitudes and values. This is why the debate must take place in a free, relaxed and unassessed environment.

- Behavioural Learning. Behavioural learning takes place above all through practical experience. In this case, the case method offers an opportunity for enhanced learning of attitudes and behaviours as part of a very real simulation within a teamwork framework.

On the basis of the above, we can conclude that the method helps students to develop certain skills and capacities, such as for example (UPM, 2008): a) managing general knowledge and information for their autonomous learning; b) anticipating and assessing the impact of their own decisions; c) intellectual abilities such as communication and interpersonal skills, and organizational and personal management skills; d)

useful values and attitudes for their professional development (autonomy, flexibility, etc.) and values that involve personal commitment (responsibility, initiative, etc.); e) individual and group work.

As we will now go on to see, these skills are very closely related with the cross-cutting competencies required to achieve sustainability, as defined by UNESCO (2017), which means that the case study method has great potential for integrating these skills into the field of education.

2. OBJECTIVES

On the basis of the previous research cited above and with the methodological proposal being presented here, we aim to help fill the gap in the current process of integrating ESD into schools and universities, using an active teaching-learning method. To this end, we have established the following specific objectives:

- – Assess the suitability of case studies for integrating the key cross-cutting competencies for sustainability as defined by the United Nations into the educational field.

- – Assess the suitability of case studies for integrating the specific learning objectives of the 17 SDGs into the educational field.

3. METHODOLOGY

The necessary change in the paradigm on the path to sustainability requires not only that we understand the problems that the planet and its inhabitants are facing, but also that we collaborate in the search for solutions (Albareda-Tiana et al., 2022). Paradigm shifts of this kind can only be achieved through education (UNESCO, 2014).

Experts in Education for Sustainable Development (ESD) propose working in a holistic interdisciplinary way, implementing participative methodologies in which the student is the central actor and through which skills acquisition is enhanced (Rieckmann, 2018).

To this end, in the current proposal, we begin by studying the key cross-cutting competencies for achieving the SDGs and the specific learning

objectives of the 17 SDGs, as specified in the recommendations on education for the UNESCO Sustainable Development Goals (Rieckmann, 2017). The nine competencies with which the activity we are designing should ideally be aligned are set out as follows (de Haan, 2010; Rieckmann, 2012; Wiek et al., 2011; in Rieckmann, 2017):

Systems thinking competency: the abilities to recognize and understand relationships; to analyse complex systems; to think of how systems are embedded within different domains and different scales; and to deal with uncertainty.

Anticipatory competency: the abilities to understand and evaluate multiple futures – possible, probable and desirable; to create one's own visions for the future; to apply the precautionary principle; to assess the consequences of actions; and to deal with risks and changes.

Normative competency: the abilities to understand and reflect on the norms and values that underlie one's actions; and to negotiate sustainability values, principles, goals, and targets, in a context of conflicts of interests and trade-offs, uncertain knowledge and contradictions.

Strategic competency: the abilities to collectively develop and implement innovative actions that further sustainability at the local level and further afield.

Collaboration competency: the abilities to learn from others; to understand and respect the needs, perspectives and actions of others (empathy); to understand, relate to and be sensitive to others (empathic leadership); to deal with conflicts in a group; and to facilitate collaborative and participatory problem solving.

Critical thinking competency: the ability to question norms, practices and opinions; to reflect on own one's values, perceptions and actions; and to take a position in the sustainability discourse.

Self-awareness competency: the ability to reflect on one's own role in the local community and (global) society; to continually evaluate and further motivate one's actions; and to deal with one's feelings and desires.

Integrated problem-solving competency: the overarching ability to apply different problem-solving frameworks to complex sustainability problems and develop viable, inclusive and equitable solution options that promote sustainable development, integrating the abovementioned competences.

For their part, the 255 specific learning objectives (15 for each SDG) have variants according to the particular SDG to which they refer, but they have a common structure and UNESCO classifies them into three

groups of domains, assigning 5 learning objectives to each domain in each SDG (Rieckmann, 2017):

- – The cognitive domain covers the knowledge and thinking tools required to gain a better understanding of the SDG and the challenges involved in achieving it.

- – The socioemotional domain includes the social skills that empower students to collaborate, negotiate and communicate with the object of promoting the SDGs, and the self-reflection skills, values, attitudes and incentives that enable them to develop.

- – The behavioural domain covers the action-centred competencies.

For each learning objective, UNESCO also suggests themes for the learning activities, as well as learning methods and approaches. These suggestions were also reviewed and taken into consideration when preparing the activity described in this paper.

Finally, we analysed the key pedagogical approaches for Education for Sustainable Development, which were also recommended by UNESCO (Rieckmann, 2017):

- – Learner-centred approach. Students are seen as autonomous learners with an active role, and teachers as facilitators of students' progress and reflection rather than simply as transferrers of knowledge (Barth, 2015).

- – Action-oriented learning. This approach requires the participation of the student in an activity (inside or outside the classroom) and according to Kolb (1984) is made up four stages: 1) Having a concrete experience, 2) Observing and reflecting, 3) Forming abstract concepts for making generalizations and, 4) Applying these concepts in new situations. One of the main advantages of this approach is that it connects theoretical concepts with real experience.

- – Transformative learning. In this approach, the teacher is a facilitator who motivates the students to question and change their traditional worldview. The aim is to ensure that they have

a better understanding of the world around them and are capable of creating new knowledge (Slavich & Zimbardo, 2012; Mezirow, 2000).

On the basis of these three key approaches for ESD, we chose to design a practical activity according to the case study method, given that it adapts perfectly to these approaches. Firstly, because in case studies, the key player is the student, who searches for and/or processes the information autonomously right from the beginning. It is also an action-oriented approach given that it exposes students to real situations (on many occasions unresolved), so connecting them with the real world and challenging them to take difficult decisions, albeit within a "safe" environment like the classroom. Finally, it could also be argued that the case study method is essentially transformative given that on most occasions the roles that the students must play oblige them to cast aside their existing views about a particular issue and adopt the positions defended by the real protagonists of the case in question.

More specifically, and in line with the three categories of case studies described by Martínez & Musitu (1995), in this activity, we selected cases from the problem-solving category, as we believed they would allow the students to work on more of these competencies and achieve a larger number of learning objectives. The number of phases in the method (and its contents) can vary depending on the authors consulted, however, they normally include individual work, work in small groups and work involving the whole class. They usually also involve a final reflection. As these and other authors make clear, the main contents of these phases are:

1. Individual work. Students read the case and search for complementary information. On occasions this also includes an initial individual analysis, which must later be checked by comparing with the other members of the group.

2. Group work. The case is analysed in small groups (4-6 students). This part includes an exchange of opinions together with the creation of hypotheses and possible solutions, evaluation of the different alternatives, etc.

3. Plenary session (whole-class phase). Each group of students presents their analysis and results to the whole class. Deliberative session with the participation of the whole class at once.

4. Final reflection. This reflection may be performed at whole-class level led by the teacher as an overall synthesis or by asking each group to carry it out independently and later share it with the rest of the class. Either way, it is essential for students to recapitulate on what they have learnt in the case study and relate it with the contents, competencies and learning objectives set out at the beginning.

The analysis and discussion phases can be sequentially divided into large blocks, such as for example (Ogliastri, 1998): 1) review of the facts, 2) analysis of the critical event, 3) alternatives for action, 4) weighing up the different options, 5) decision and 6) conclusions (the number and type of blocks may vary depending on the type of case study being analysed).

As is obvious, within this general structure a wide range of very different approaches or methods may be used, depending on the learning objectives and the topics for discussion. In the proposal being presented here, we used the CARVE method (Gampel, 2009), an approach that is particularly well-suited for case studies. This method involves a multidisciplinary approach to different types of conflicts with various dimensions:

- C: Consequences of all the alternatives. Positive and negative. These consequences can also be sub-divided (economic, social, environmental…).
- A: Autonomy of the subjects. They study the degree to which those affected by the problems presented in the case study can take part in their solution (e.g. patients allowed to take decisions regarding their treatment on the basis of their "informed consent").
- R: Rights that are restricted/affected. Related with the previous dimension, but viewed from a legal (legal rights) or moral (moral rights) perspective.

- V: Virtues that are affected. Individual or collective (i.e.: institutional) virtues which are enhanced or impaired.
- E: Equity. Social equity/Environmental justice. In this last section, they evaluate whether when faced with similar situations they would opt for similar solutions (objectivity/fairness) or whether in a certain given situation all the subjects or agents involved are treated fairly, in the same way (regardless of their income, race, ideology…).

These dimensions must be analysed for all the proposed solution options or alternatives, in our case using lists of the pros and cons for each dimension (i.e. positive and negative economic consequences, rights that are infringed or respected, etc.). In addition, in order to analyse this in more detail, it is a good idea to then order these pros and cons on the basis of their importance (i.e. it is not the same to infringe someone's right to honour by slandering them as to infringe their right to freedom by unjustly imprisoning them). Finally, the students must draw up a report and prepare an oral presentation to the whole class with a summary of the results of their analysis.

The proposed activity presented here has been applied in various subjects in the degree in Environmental Sciences and in the degree in Tourism, in the University of Granada and in the University of Alcalá, since academic year 2017/18. It is also been applied in various summer courses on environmental issues. The students worked on various real case studies that happened in Spain in recent years. They were all related with different dimensions of sustainability and were taken from one of our earlier publications (Burgui & Chuvieco, 2017). The aim was to assess the suitability of the case study method for improving the specific learning objectives and competencies of the SDGs. The cases on which most work was done included: "Floods in the Ebro River Basin", "Villar de Cañas Radioactive Waste Deposit", "Freeing of minks in Galicia" or "The Algarrobico Hotel". These cases were studied for a variety of reasons, such as their topicality, their complexity and difficulty (it is important that the cases be seen as a challenge for the students, so as to arouse their interest), and also because they provide an excellent base

from which to study a whole array of interesting questions relating to the economy, society, politics, law, the environment, moral issues, etc.

4. RESULTS AND DISCUSSION

In order to analyse the suitability of case studies for integrating learning objectives and competencies in sustainability into the classroom, we carried out an evaluation at various levels. We began by assessing the key cross-cutting competencies for achieving the SDGs and the specific learning objectives, and then went on to evaluate the case method and the CARVE method.

In the evaluation, we used the typical range of four colours used in the weightings for the performance of the SDGs in their different spheres (Figures 1 and 2). In this proposal, the colours were used on the basis of the degree (very high, high, medium or low) to which the particular phase (individual work, group work, presentation to the class and final reflection) of the case study method enabled us to integrate the learning objectives and competencies into classroom practice.

Figure 1 shows the weightings allocated to the different phases in the Case Study method according to the degree to which they help students practise the competencies.

FIGURE 1. *Weightings according to the degree to which the different phases of the case study method allow students/teachers to work on the cross-cutting competencies.*

Key cross-cutting competencies for achieving the SDGs	Phase of the Case Method				
	Individual work	Group work	Present to class	Final reflection	$\overline{X}$
Systems thinking competency	4	4	3	4	3.75
Anticipatory competency	4	4	3	4	3.75
Normative competency	4	4	3	4	3.75
Strategic competency	2	4	4	4	3.5
Collaboration competency	1	4	4	4	3.25
Critical thinking competency	4	4	3	4	3.75
Self-awareness competency	3	4	4	4	3.75
Integrated problem-solving competency	3	4	4	4	3.75
Average:	3.13	4.00	3.50	4.00	**3.66**

Source: the author

Although quantifying the suitability of each phase numerically was not our main objective, by way of illustration, values of 1 to 4 were assigned to each colour. As can be seen in Figure 1, all the phases helped develop all the competencies. The only exceptions were the Strategic Competency and the Collaboration Competency in the individual work phase. This was as expected given that in this phase the student works mostly on their own and the collaborative aspect is less important (although it does not completely "disappear" in that the students are advised that their individual work will later be shared and compared in a group situation). It is important to note however that the 4-point weighting awarded to all the competencies during the final reflection phase depends to a large extent on how the teacher approaches this phase. We therefore recommend that the teacher prepares a set of questions which, when correctly formulated, will enable the students to reflect on issues relating to all eight competencies (regardless of whether these reflections are carried out as a whole class or in small groups).

Figure 2 shows the degree to which the different dimensions of the CARVE method allow teachers to work on the cross-cutting competencies for sustainability.

FIGURE 2. *Weightings according to the usefulness of the different dimensions of the CARVE method for developing the cross-cutting competencies for sustainability.*

Key cross-cutting competencies for achieving the SDGs	Dimensions of the CARVE method					
	Consequences	Autonomy	Rights	Virtues	Equity	$\overline{X}$
Systems thinking competency	4	4	4	2	4	3.60
Anticipatory competency	4	4	4	3	4	3.80
Normative competency	4	4	4	4	4	4.00
Strategic competency	4	4	4	4	4	4.00
Collaboration competency	4	4	4	4	4	4.00
Critical thinking competency	4	4	4	4	4	4.00
Self-awareness competency	3	3	3	4	3	3.20
Integrated problem-solving competency	4	4	4	4	4	4.00
Average:	3.88	3.88	3.88	3.63	3.88	3.83

Source: the author

This method has certain particularities compared to other analytical approaches. These include the Virtues dimension, an unusual dimension

that is not easy for the students to understand or visualize when it crops up in the case they are discussing. In order to overcome these difficulties, the teacher must remind them that they can also talk about collective virtues (referring to an institution, a company etc). In fact, this dimension is more useful than others for example for working on the self-awareness competency. By contrast, virtues are often less represented in competencies such as the systems thinking or anticipatory competencies (as defined by the UNESCO guidelines on ESD (Rieckmann, 2017)), with certain exceptions such as the precautionary principle (associated with the virtue of prudence).

On average, in the real cases analysed by the students this method was estimated to have enhanced work on the key competencies for ESD to a high degree (3.83/4). However, it is important here to highlight that the work to develop these competencies will depend to a large extent on the particular case selected. In other words, one could argue that the degree to which the CARVE method will be useful for developing the competencies will be more dependent on the case they are working on than on the different phases of the case method. This is because in the different phases of the case method, what changes is the way of working (individual, small groups, whole class…) rather than the content being discussed and it is therefore relatively unaffected by the selection of one case study or another for the students to work on. By contrast the usefulness of the different dimensions of the CARVE method for working on the different ESD competencies will vary according to the practical case study that they select (the general subject matter, the actors involved, the contextual variables, the appearance of legal or ethical dilemmas, etc.).

In order to illustrate this with an example, let's imagine a case in which the Consequences Dimension is being analysed. This dimension has a wide range of possible themes (economic, social, environmental, political consequences …), which means that it is normally very well represented in any case study, in that the wide range of possible themes means that there is always some issue that can be discussed in relation to a cross-cutting ESD competency. By contrast, the other dimensions of the CARVE method (legal, moral aspects …) are not always represented so highly, which limits their value for developing these competencies. For

this reason, we recommend that teachers look for complex cases involving a large number and a broad diversity of agents, a wide variety of themes, and different scales of conflict (local, regional, national…), etc.

We then carried out a similar assessment for the specific learning objectives. In this case there is not much point in assessing how useful the different phases of the case method are given that the result will depend almost exclusively on the topics covered in each case study selected. For this reason, we only assessed the degree to which the dimensions of the CARVE method enabled teachers to work on the specific learning objectives of the 17 SDGs. These objectives were grouped together in the three domains proposed by UNESCO (Rieckmann, 2017): cognitive, socioemotional and behavioural (Figure 3).

FIGURE 3. *Weightings according to the degree which the different dimensions of the CARVE method help achieve the specific learning objectives of each SDG. The learning objectives are grouped into: CG (Cognitive), SE (Socioemotional) and BH (Behavioural).*

Dimensions of the CARVE Method:	Consequences			Autonomy			Rights			Virtues			Equity			
Sustainable Development Goals	CG	SE	BH	CG	SE	BH	CG	SE	BH	CG	SE	BH	CG	SE	BH	$\overline{X}$
1. No poverty	4	4	3	4	4	3	4	3	2	4	4	3	4	4	3	3.53
2. Zero hunger	4	4	3	4	4	3	4	4	2	4	4	3	4	4	3	3.60
3. Good health and wellbeing	4	4	3	4	4	3	4	4	3	4	4	4	4	4	3	3.73
4. Quality education	4	4	3	4	4	3	4	3	3	4	4	3	4	4	3	3.60
5. Gender equality	4	4	4	4	4	4	4	4	4	4	4	3	4	4	4	3.93
6. Clean water and sanitation	4	4	4	4	4	4	4	4	4	3	4	4	4	4	4	3.93
7. Affordable and clean energy	4	4	3	4	4	3	3	4	3	3	4	3	4	4	3	3.53
8. Decent work and economic growth	4	4	4	4	4	4	4	4	3	3	3	4	4	4	4	3.80
9. Industry, innovation and infrastructure	4	3	2	4	3	3	3	3	3	2	3	2	3	3	2	2.87
10. Reduced inequalities	4	4	4	4	4	4	4	4	3	4	4	3	4	4	4	3.87
11. Sustainable cities and communities	4	4	3	4	4	3	3	3	3	3	4	3	3	4	3	3.40
12. Responsible consumption and production	4	4	4	4	4	4	3	3	3	4	4	4	4	3	3	3.67
13. Climate action	4	4	4	4	4	4	3	3	3	3	4	4	4	3	4	3.67
14. Life below water	4	3	4	3	3	2	2	3	3	2	4	2	3	3	2	2.87
15. Life on land	4	4	3	3	3	2	3	3	2	2	4	2	2	3	3	2.87
16. Peace, justice and strong institutions	4	4	2	4	4	2	4	4	2	3	4	2	4	4	2	3.27
17. Partnerships for the goals	4	4	3	3	3	2	3	2	2	2	4	3	3	3	3	2.93
	4.0	3.9	3.3	3.8	3.8	3.1	3.5	3.4	2.8	3.2	3.9	3.1	3.6	3.6	3.1	**3.47**

Source: the author

As happened with the competencies, the average score for the achievement of the learning objectives was in general quite high (3.47/4). Nonetheless, it seems that in the more purely science- or nature-related

objectives (SDG 14 and 15, for example) the scores were lower, perhaps because the CARVE method does not adapt so well to these specific learning objectives, as defined in the UNESCO document (Rieckmann, 2017). The main exception here is the Consequences Dimension which, as indicated earlier, offers a wide variety of themes (i.e.: environmental consequences).

Another SDG with a relatively poor score is nº 9 (Industry, Innovation and Infrastructure), perhaps because it covers an area with which the students are less familiar. In other words, the score awarded is the fruit of an interaction between on the one hand how the learning objectives for each SDG are defined by the UNESCO and also how suited they are to the different dimensions of the CARVE method. In most of the SDGs, the socioemotional and behavioural learning objectives, and in particular the latter, are very clearly oriented towards the social and political action of the students at a national or international level. It is therefore understandable that in many SDGs it is impossible to reach a high degree of achievement of the learning objectives, especially those within the behavioural domain. This explains why this domain is the one with the lowest average scores.

In order to illustrate this with specific concrete examples, Table 1 includes for each SDG a specific learning objective within the behavioural domain, which is very difficult for these students to achieve. So as to avoid making this unnecessarily long, we have included just one behavioural objective for each SDG as an example, although the repeatedly cited UNESCO publication (Rieckmann, 2017) makes clear that there are various learning objectives that are very difficult to achieve. The number that appears alongside the name of each learning objective, is the same number allocated to it in the aforementioned UNESCO recommendations, so as to enable it to be located more easily.

TABLE 1. *Examples of specific learning objectives from the behavioural domain that are very difficult for the students to achieve.*

Nº SDG	Specific learning objective (behavioural domain)
1	"3. The learner is able to evaluate, participate in and influence decision-making related to management strategies of local, national and international enterprises concerning poverty generation and eradication".
2	"2. The learner is able to evaluate, participate in and influence decision-making related to public policies concerning the combat against hunger and malnutrition and the promotion of sustainable agriculture".
3	"5. The learner is able to propose ways to address possible conflicts between the public interest in offering medicine at affordable prices and private interests within the pharmaceutical industry".
4	"1. The learner is able to contribute to facilitating and implementing quality education for all, ESD and related approaches at different levels".
5	"5. The learner is able to plan, implement, support and evaluate strategies for gender equality".
6	"1. The learner is able to cooperate with local authorities in the improvement of local capacity for self-sufficiency".
7	"4. The learner is able to influence public policies related to energy production, supply and usage".
8	"2. The learner is able to facilitate improvements related to unfair wages, unequal pay for equal work and bad working conditions".
9	"5. The learner is able to work with decision-makers to improve the uptake of sustainable infrastructure (including internet access)".
10	"5. The learner is able to engage in the development of public policies and corporate activities that reduce inequalities".
11	"2. The learner is able to participate in and influence decision processes about their community".
12	"2. The learner is able to evaluate, participate in and influence decision-making processes about acquisitions in the public sector".
13	"3. The learner is able to anticipate, estimate and assess the impact of personal, local and national decisions or activities on other people and world regions".
14	"4. The learner is able to contact their representatives to discuss overfishing as a threat to local livelihood".
15	"3. The learner is able to work with policy-makers to improve legislation for biodiversity and nature conservation, and its implementation".
16	"4. The learner is able to become an agent of change in local decision-making, speaking up against injustice".
17	"5. The learner is able to influence companies to become part of global partnerships for sustainable development".

Source: Drawn up by the author on the basis of Rieckmann (2017)

In short, a review in some detail of the aforementioned document shows that all the SDGs include various behavioural objectives that are very difficult to achieve in the teaching-learning process, regardless of the pedagogical method used. This is because they are very far removed from the educational sphere and in the specific case of primary and secondary education have little relation with the independent decision-making capacity of children. In other words, the action-oriented learning which is proposed in the UNESCO documents analysed does not depend exclusively on students or teachers: many other external variables come into play which reduce the real possibilities of such action by the students.

5. CONCLUSIONS

Education for Sustainable Development and its application at different education levels for the achievement of the SDGs is an issue that must be urgently addressed in today's society. Only in this way can we redirect development, production and consumption models and patterns which are putting the environmental stability of the planet and its biodiversity at risk, as well as the health and safety of the human species.

However, according to reports from international organizations (UNESCO, 2022) large numbers of teachers consider themselves unprepared to take on this educational challenge. It is therefore necessary to continue working to create active pedagogical tools and methods, and to assess their suitability for the effective application of ESD in different educational environments.

The objective of the work being presented here was to assess the application of a quite well-known pedagogical method (the case study method) together with a more specific and less well-known variant (the CARVE method) and assess their suitability for furthering the key cross-cutting competencies and specific learning objectives of the 17 SDGs.

The results of the assessment show that, in the educational field, case studies could be very useful for working on the key competencies for sustainability recommended by the United Nations. As regards the specific learning objectives of each one of these 17 SDGs, the analysis shows a high degree of applicability of the CARVE method, in particular

for the cognitive objectives and to a lesser extent for the socioemotional and behavioural objectives, the second of which are the most difficult to achieve, as defined by UNESCO (Rieckmann, 2017). From the analysis presented here, one can deduce that the socioemotional objectives and especially the behavioural objectives are defined in a very ambitious way by UNESCO. In order to achieve higher levels of achievement of these objectives, both students and teachers will require capacities and influence that go beyond the educational sphere and which they currently do not possess.

Finally, the achievement of the specific learning objectives of the SDGs will also depend to a large extent on the practical case studies selected for analysis by the students. On this question we recommend selecting cases with complex conflicts that pose a challenge for the students. These conflicts should be multi-agent (in which many different social actors take part), multi-scale (cases that affect different territorial scales) and multi-dimensional (in which the students can work on different fields of knowledge: economics, society, environment…). In this way they can help these students achieve a larger number of the learning objectives.

6. REFERENCES

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