

## **Teaching SEA in a country without regulation: challenging this scenario?**

Abstract: Brazil has a long-standing systematic practice (more than 40 years) and mandatory Impact Assessment of projects that is taught in several undergraduate and postgraduate courses. Strategic Environmental Assessment remains locally discretionary and unregulated, despite mentioned in legal provisions of Brazilian states and almost forgotten in local education. Teaching impact assessment is not trivial and poses challenges to teach and train professionals who will work in interdisciplinary teams, being pivotal to contributing to the quality of practice. In a country with experience limited to around 70 SEA reports and with sparse regulatory proposals beginning in 1994, designing an SEA course for undergraduate students represents a major responsibility to break this inertia and build a learning atmosphere to boost its appropriate use in the country. The objective of this work is to discuss the pioneering proposal and offering of the first undergraduate SEA course at the Universidade de São Paulo, supported by the IAIA framework on Teaching Impact Assessment. The comparison of these principles, of international good practices, expected (proposal) and achieved (offering), revealed results for improvement in future cycles that still come up against limited practice. The principle of pedagogy is the most consistent, based on the lecturer's theoretical and professional experience. However, the principles of content and skill need to be strengthened and the lack of a mandatory and regular SEA scenario negatively impacts them. Despite the limitations, teaching SEA is essential to disseminate the instrument and build the desired practice in Brazil.

## **Teaching SEA in a country without regulation: challenging this scenario?**

Teaching impact assessment (IA) is fundamental to its good practice (Enríquez-de-Salamanca, 2019). The importance of the topic resulted in a good practice guide for Teaching Impact Assessment (Pope and Morrison-Saunders, 2018; Morrison-Saunders et al., 2020).

Brazil has more than 40 years of formal and mandatory application of EIA for engineering projects but it is still in an early development stage considering the research field (Duarte et al., 2017).

SEA remains discretionary in Brazil, with only 68 recognized cases in Brazilian planning (or identified since there is no repository) (Tshibangu and Montaña, 2019), predominantly carried out under the support of multilateral funding agencies. According to Gallardo et al. (2021), research with SEA is also positioned at an early stage of development.

Discussing IA in Brazilian education, Ramos et al. (2025) observed that SEA is often a topic inside EIA courses. It is an independent discipline in only 2 undergraduate courses, differently from EIA, which is present in most environmental engineering courses evaluated by Veronez and Malvestio (2022) as mandatory and formal teaching.

However, Raimundo and Almeida et al. (2022) reinforced that SEA is an often overlooked topic in IA teaching in Brazilian undergraduate engineering programs.

Since the first attempt to formalize SEA in Brazil, in 1994, some local and specific laws have been presented, gradually and spaced out, but without comprising the broad planning and the entire country (Crespo and Raimundo, 2018; Gallardo et al. 2022). The recurring attempts to modify the environmental licensing framework linked to IA in the country, with the latest proposal from 2021, aim to accelerate and be flexible licensing, weakening the role of IA (Athayde et al. 2022), without fostering a proper inclusion of SEA at the federal level.

In this context, a professor of environmental engineering at the best international-rated Brazilian university, and a specialist in IA, proposed a dedicated SEA discipline at the undergraduate level. The objective is to discuss the pioneering proposal and to offer the first SEA course for undergraduate students at the Universidade de São Paulo (USP), using the IAIA framework for Teaching IA.

## Method

The SEA subject to be evaluated is one of two offered in two Engineering schools at the Universidade de São Paulo (<https://uspdigital.usp.br/jupiterweb/obterDisciplina?nomdis=avaliacao%20ambiental%20estrategic&sgldis=>), started in 2018 and 2019, under the responsibility of two professors specializing in IA, who are among the three who publish the most on SEA in Brazil (Gallardo et al. 2022).

The first class was from 2020, with 61 students, and the second one from 2021, with 98 students, both taught during the pandemic in an exclusively remote format. The next offering is for the 2nd semester of 2024. The subject was not offered in 2022 or 2023, the professor's postdoctoral period abroad, as there was no other professor in the department with the technical knowledge to offer it.

According to the syllabus, the SEA discipline does not have exams, but the students must carry out activities in the classroom and outside, seminars with papers and SEA reports, and they are encouraged to follow and engage in forums and chats on Moodle.

In an exploratory approach, to analyze this case study, in its two cycles of offering, the IAIA framework on Teaching IA (Pope and Morrison-Saunders, 2018; Morrison-Saunders et al., 2020) was used, comparing the expected principles (in the course syllabus) and perceived if achieved (in both offerings, according to the teacher's perception of the student's performance). The assessment was binary (yes or no), when "no" represents no evidence that validates the principle could be perceived by the teacher. However, "yes" does not necessarily represent that the principle is being adequately explored, which means room for potential improvement.

The main limitation of this research refers to the perspective of the teacher's exclusive analysis, with no interviews being carried out with the students, monitors, or invited lecturers.

## Results

The discipline, offered within the scope of a civil and environmental engineering department with a workload of 60 class hours, is not mandatory but can be chosen as a free elective discipline or within the specialization modules. In both offers, the main audience (because they have priority for enrolment ) were engineering students, not limited to civil and environmental engineering, but other types too, also serving other courses, such as environmental management and international relations. During the pandemic, synchronous and monitored classes allowed attracting students from other campuses located outside the host city. The initial number of enrolment places had to be increased to meet the number of enrolled students.

Professor Rosário Partidário (IST) gave a lecture in the first offering and Professor Marcelo Montañó (who teaches another SEA discipline at USP) was responsible for the lecture in the second offering. Professional Fernanda Correa from the Arcadis consultancy, which coordinates SEA studies in Brazil, was a speaker at both offerings.

Tables 1 to 3 analyze the principles of best practices applied to the SEA discipline.

Table 1 – Principles: contexts

| Principles: Contents   | Extremely or very important for teaching |           | Comments  |
|--|--|-----------|---|
|  | expected                                 | perceived |   |
| Integrates the theory and practice of IA   | Yes                                      | Yes       | The program uses lectures and practical activities  |
| Incorporates research contributions  | Yes                                      | Yes       | Students work with scientific articles in activities  |
| Presents international best practice principles  | Yes                                      | Yes       | There is a specific class on SEA frameworks and good practices  |
| Presents the requirements of specific standards, regulations, or procedures relevant to the participants | Yes                                      | Yes       | The first two classes focus on the EIA of projects and the assessment of cumulative impacts is also part of a class in the course   |
| Explores professional ethics   | No                                       | No        | Ethical issues are only considered implicitly in the course program and lightly permeate some classroom discussions   |
| Positions EIA as an interdisciplinary process  | Yes                                      | Yes       | Interdisciplinarity permeates several classes of the discipline and the diverse composition of students' backgrounds corroborates this principle  |
| Presents IA as a pluralistic process   | Yes                                      | Yes       | There is a class on public participation in SEA, speakers also brought some data on this principle  |
| Presents IA as being both socio-political and technical in nature  | Yes                                      | Yes       | Both the class on decision-making in SEA and other classes on baseline, for example, address this principle   |
| Fosters sustainability-oriented norms and values   | Yes                                      | Yes       | There is a class that discusses the integration of sustainability in SEA  |
| Provides practical methods and tools   | Yes                                      | Yes       | There is more than one class in the program that covers methods and tools, with Brazilian and international case studies. The final seminar also requests an analysis of the method used in the analyzed SEA. |

Table 2 – Principles: pedagogy

| Principles: Pedagogy  | Extremely or very important for teaching |          | Comments  |
|---|--|----------|---|
|   | expected                                 | achieved |   |
| Is tailored to the context, needs, and capacities of learners | Yes                                      | Yes      | As it was known that some students do not know IA, the first two lectures tried to alleviate this deficiency,                       |
| Is flexible   | No                                       | No       | The course has a program to be followed, small adjustments can be made, but there is no wide flexibility                            |
| Facilitates co-learning                                       | No                                       | No       | Not applicable  |
| Simulates Key features of IA practice                         | Yes                                      | Yes      | Teamwork is strongly encouraged, including seeking a multidisciplinary group composition  |
| Provides opportunities for discussion and debate              | Yes                                      | Yes      | Students are encouraged to participate, and this principle makes up the final grade   |
| Utilizes case studies   | Yes                                      | Yes      | There are specific classes dedicated to analyzing Brazilian cases and international cases (regulated and non-regulated SEA systems) |
| Provides opportunities to gain practice experience            | Yes                                      | Yes      | Students develop the final seminar using a real SEA study.  |
| Facilitates self-learning                                     | Yes                                      | No       | As the practice of SEA is very limited, unlike other training subjects, there were no students who worked specifically with SEA     |
| Is memorable and fun  | Yes                                      | Yes      | In both offerings, students were satisfied with the learning environment created in the course.                                     |

Table 3 – Principles: Essential skills

| Principles: Essential skills               | Extremely or very important for teaching |          | Comments   |
|--|--|----------|--|
|  | expected                                 | achieved |  |
| Integrative and systems thinking           | Yes                                      | Yes      | The activities developed were focused on promoting critical evaluation   |
| Critical thinking                          | Yes                                      | Yes      | The activities developed were focused on promoting critical evaluation   |
| Judgment                                   | Yes                                      | No       | The activities developed did not allow reaching this level of judgment   |
| Written communication skills               | No                                       | No       | The focus of activities was aimed at a specialist audience   |
| Oral communication skills                  | No                                       | No       | Oral communication was encouraged, but the SEA instrument is for discussion, not to prepare for dialogue with different stakeholders |
| Collaboration and teamwork skills          | Yes                                      | Yes      | Carrying out group activities allowed them to develop this skill   |
| Project management and coordination skills | No                                       | No       | This management skill was neither acquired nor expected in the course  |
| Research skills                            | No                                       | No       | The course has a more analytical focus, not on the construction of the SEA study   |
| Job readiness                              | No                                       | No       | The course focuses more on the skills of understanding SEA, not on coordinating a SEA  |

Considering the three categories of principles, regarding the content and pedagogy of the discipline, the teacher tried to contemplate them in their entirety and had a perception of reach for almost everyone during the course. Regarding “skills”, less than half of these principles were not even considered when preparing the discipline and only two of them were perceived as achieved during the course.

## Discussion and Conclusions

The first two offerings of the SEA discipline for engineering undergraduates revealed a high demand by students (61 and 90 students, respectively), considering that it is an elective subject of a non-mandatory instrument in the country. Thus, even without the

mirror of mandatory and practical experience, the SEA theme was deemed important in the training path of these students.

The comparison of principles on how teaching environmental assessment with this experience in teaching this subject in Brazil revealed results for future improvement. The content principles, except for professional ethics, were considered in building the syllabus and could be confirmed in the development of the course. This confirms what Enríquez-de-Salamanca (2019) highlighted about the importance of having IA specialists teaching courses of this nature in an attempt to overcome some weaknesses in IA teaching in Brazil as detected by Almeida and Raimundo et al. (2022).

The principles related to pedagogy denoted that several strategies were used by the teacher to ensure effective learning with SEA. It tries to avoid generating a negative vicious cycle between teaching and practice as observed by Veronez and Malvestio (2022).

The principles related to skills were very little sought after in the discipline proposal and less achieved in its implementation. As there is no systematic practice and the potential for professional performance with the instrument is extremely limited, the discipline was less ambitious with the intended skills to guarantee space in the course in more technical aspects that reinforce the importance of the instrument. This is clearly in line with a situation of non-systematic and unregulated SEA practice in the country (Gallardo et al., 2022).

Difficulties were identified in aligning all the principles of best practice in the proposal of the discipline and, consequently, these are accentuated when offering it.

One of the most relevant points of this SEA experience in undergraduate engineering is overcoming the stigma observed in Brazilian IA teaching practice, of SEA being just a topic within EIA teaching as observed in Ramos et al. (2015).

However, the results revealed a need for improvement in future cycles that still come up against limited practice. One of the great challenges of teaching SEA in the engineering course observed in this experience is to train students and show the importance of the subject, in a context in which the instrument is voluntary and the regulation advances locally and at a snail's pace.

Teaching SEA is essential in Brazil so that future professionals can apply the instrument with quality and safety and disseminate its need in the country's planning. This pioneer experience in teaching SEA in a country without regulation has brought an analysis of the best practices on Teaching IA and reinforced the role of education in prompting Brazilian SEA practice.

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