Insights from a sustainability-oriented academic Bachelor program in a Caribbean Small Island State: evaluation of SISSTEM using the GreenComp Framework

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1 Introduction

1.1 Contextual setting: sustainability challenges of Aruba

Aruba is a small island state located in the Caribbean, with a size of about 180 km² and about 112,000 inhabitants[1]. By promoting the island as the ultimate tropical holiday destination[2], the "one happy island" attracts more than 1.6 million tourists per year[3] and has the highest tourism intensity index in the world after Macao[4]. The almost sole dependency on the tourism industry (87% of the GDP[5]) and its trade openness, however, makes Aruba "the most vulnerable small open economy in the Caribbean"[6]. Moreover, the tourism sector and its further expansion are putting a severe pressure on the island, even exceeding its carrying capacity[7]. In order to reduce this pressure and this vulnerability, it has been argued that Aruba's economy should become more diverse and less dependent exclusively on tourism[8].

Aruba also faces other sustainability challenges: a strong dependence on food and oil imports, a complete dependence on reverse-osmosis for fresh water production, and challenges with waste management. Aruba is also highly urbanized with a high population density, largely related to the construction of accommodation and other facilities needed to support the tourism industry. Since these tourist residences are mainly located along the shores, they impact the marine environment as they cut off coastline interaction between the marine and terrestrial environment[9].

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[1] CBS Aruba, "Quarerly Demographic Bullletin2020."
[2] ATA, "Tourisme Op Aruba."
[3] CBS Aruba, "Economic Indicator: Tourism."
[4] Manera and Valle, "Tourist Intensity in the World, 1995-2015: Two Measurement Proposals."
[5] IMF, "June 2019 KINGDOM OF THE NETHERLANDS—ARUBA: 2019 ARTICLE IV CONSULTATION DISCUSSIONS"; Peterson, "Over the Caribbean Top: Community Well-Being and Over-Tourism in Small Island Tourism Economies"; Alberts, "Small Island Tourism Economies and the Tourism Area Lifecycle. Why Aruba and Sint Maarten Have Exceeded Their Carrying Capacity."
[6] CBA, "Fostering Economic Resilience: From Roots to Routes," 10.
[7] DEACI, "ECONOMIC OUTLOOK 2023- 2024."
[8] DEACI, "Economic Policy 2019-2022."
[9] UN-OHRLLS, "The Impact of Climate Change on the Development Prospects of the Least Developed Countries and Small Island Developing States"; de Scisciolo et al., "Beach Debris on Aruba, Southern Caribbean: Attribution to Local Land-Based and Distal Marine-Based Sources."

1.2 The need for locally embedded curricula and ESD in a SIS like Aruba

In the past, external consultancies' solutions to address the sustainability challenges of Aruba have not always been effective. Given the complexity and interconnectedness of the above-mentioned sustainability challenges, the island requires more than mere independent technological or economic quick-fix interventions. Obviously, there are limits to the technological innovations to solve the interconnected sustainability issues that cover both the environmental, social and economic aspects of the society[10]. Due to the absence of any university-level education in STEM before 2019, the island was highly dependent on external education, leading to a brain drain and limiting a sustainable knowledge base on the island itself, in turn, making the island largely dependent on external consultant-led initiatives and interventions. Hence, Aruba needs a systemic shift, including a shift in its economy, education and workforce. In particular, the workforce needs a more holistic skillset to address the social, environmental and economic challenges of the island[11]. In this context, Education for Sustainable Development (ESD) is crucial, whereby lecturing goes beyond the simple transfer of information from teacher to student, but students are equipped with the knowledge, skills, values and attitudes needed to bring about a systemic transformation[12], within the local context[13]. ESD has emerged as a framework to address the curricular and institutional needs to promote learners' ownership of the sustainability agenda[14].

Over the past two decades, ESD has received a lot of attention, as the United Nations Decade of ESD (2005 – 2014) has provided a means to create momentum around the topic[15]. Furthermore in the context of SIS in general and the Caribbean in particular, the literature on ESD is growing. Hiebert (2013) wrote a study on best practices and gaps in the implementation of ESD in 10 SIS across the globe. Crossley and Sprague (2014) reviewed a number of ESD initiatives that have been executed in several SIS and SIS regions, including in Tonga and the Solomon Islands, as well as initiatives from the University of the South Pacific, and in the Caribbean[16]. Eppinga *et al.* (2019) published an article on the impact of a course taught at the University of Aruba on the environmental awareness of the students [17]. Eppinga *et al.* (2020) also described an approach to embed sustainability into a specific course at the University of Aruba focusing on developing research skills [18]. Recently, Ferguson *et al.* (2021) reported on Jamaican high school teachers' perceptions on sustainable development[19]. Additionally, Gajparia developed an assessment method of ESD-related learning and applied it to a Master's degree program at the University of the West Indies[20]. Nazir (2021) has published a theoretical position

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[10] Hiebert, "Education for Sustainable Development in Small Island Developing States."
[11] Hermans and Kösters, "Labour Force on the Dutch Caribbean Islands ."
[12] Orr, "1 . What Is Education For ?"
[13] Lozano et al., "Connecting Competences and Pedagogical Approaches for Sustainable Development in Higher Education: A Literature Review and Framework Proposal"; Eppinga, Mijts, and Santos, "Ranking the Sustainable Development Goals : Perceived Sustainability Priorities in Small Island States."
[14] Pauw et al., "The Effectiveness of Education for Sustainable Development."
[15] Acosta Castellanos and Queiruga-Dios, "From Environmental Education to Education for Sustainable Development in Higher Education: A Systematic Review."
[16] Crossley and Sprague, "Education for Sustainable Development: Implications for Small Island Developing States (SIDS)."
[17] Eppinga, de Scisciolo, and Mijts, "Environmental Science Education in a Small Island State: Integrating Theory and Local Experience."
[18] Eppinga et al., "Putting Sustainability Research into Practice on the University Campus: An Example from a Caribbean Small Island State."
[19] Ferguson, Roofe, and Cook, "Teachers' Perspectives on Sustainable Development: The Implications for Education for Sustainable Development."
[20] Gajparia et al., "Identifying Assessment Opportunities in Postgraduate Learning for Sustainability."

article on environmental and sustainability education in a Caribbean context, and Down and Ferguson (2022) proposed a contextualized framework for pedagogy, processes and practices for ESD in the Caribbean. Adequate embedding of ESD initiatives within the Caribbean SIS context is crucial to ensure that these efforts indeed support the intended transformations toward socially and environmentally just societies[21]. However, despite the growing body of literature on ESD in SIS and especially in a Caribbean context, according to Nazir (2021), there have been few initiatives for ESD in the Caribbean region, most of these being rather recent. A theory-practice gap has been suggested, where the theory is well developed yet not embedded in actual education programs[22]. More specifically, Nazir emphasizes the lack of "contextually based, multidimensional, care-based and experiential learning" in the existing formal education structures[23], and advocates the development of new programs that focus on raising environmental consciousness, to further deepen them through action and to critically analyze the current programmes to improve their effectiveness[24]. The lack of actual implementation of ESD in SIS is unfortunate, as ESD indeed can have a nationwide transformational impact, since these islands are small and hence social, environmental and economic interlinkages are tight[25].

1.3 SISSTEM and the GreenComp Framework

Within this context, SISSTEM – Sustainable Island Solutions through Science, Technology, Engineering and Mathematics (STEM)[26] – is an academic education and research initiative at the University of Aruba that aims to educate local and regional students in STEM at tertiary level, focusing on sustainability issues in SIS. The program that started in 2019, was developed in collaboration with KU Leuven, specifically to equip the students with a solid background in STEM knowledge, as well as with the competences, skills and attitudes to apply this knowledge to enhance the sustainable development of Aruba and other SIS[27]. As the program was developed at a moment where the ESD theory was being established, ESD was used as a guiding framework. The entire SISSTEM program consists of an academic Bachelor, Master of Science and research program in Sustainable Engineering, as well as a component that focuses on service to society.

In this article, we focus on the Bachelor program. We investigate how ESD at higher educational level is put into practice throughout the curriculum and how it can be adapted in a SIS context. To evaluate the extent to which and how this program is effectively equipping the students with ESD competences, we select the GreenComp Framework[28] as the backbone and rationale for our analysis. The GreenComp framework was developed by Bianchi et al. (2022) for the Joint Research Centre of the European Commission. Its goal is to "provide a common ground to learners and guidance to educators, providing a consensual definition of what sustainability as a competence entails"[29]. One of its intended uses is self-assessment and reflection and the review of curricula, which is how we used it in the current research. The Greencomp framework

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[21] Brissett, "Caribbean Dreams: Education for More than Just Sustainable Development."
[22] Nazir, "Knowledge Is Not Enough: Reimagining Environmental and Sustainability Education in the Caribbean as Environmental Conciousness Raising."
[23] Nazir, 174.
[24] Nazir, "Knowledge Is Not Enough: Reimagining Environmental and Sustainability Education in the Caribbean as Environmental Conciousness Raising."
[25] Hiebert, "Education for Sustainable Development in Small Island Developing States."
[26] https://sisstemaruba.com/
[27] Mertens et al., "SISSTEM: Sustainable Development on the Small Island State of Aruba."
[28] Bianchi, Pisiotis, and Cabrera Giraldez, GreenComp - The European Sustainability Comptetence Framework.
[29] Bianchi, Pisiotis, and Cabrera Giraldez, 2.

defines 12 competences for sustainability, grouped into 4 areas (Table 1). Each competence is subdivided into a number of knowledge, skills and attitudes statements, as described by Bianchi et al (2022)[28]. The GreenComp Framework by itself does not provide a proposed methodology to conduct this self-assessment and reflection on curriculum. Therefore, we propose our own evaluation methods, further outlined in the next section.

Table 1: Overview of 4 areas (bold and highlighted in grey) and 12 competences for sustainability as defined in the Greencomp framework[28]

Embodying sustainability values	**Embracing complexity in sustainability**
Valuing sustainability: To reflect on personal values; identify and explain how values vary among people and over time, while critically evaluating how they align with sustainability values.	Systems thinking: To approach a sustainability problem from all sides; to consider time, space and context in order to understand how elements interact within and between systems.
Supporting fairness: To support equity and justice for current and future generations and learn from previous generations for sustainability.	Critical thinking: To assess information and arguments*, identify assumptions, challenge the status quo, and reflect on how personal, social and cultural backgrounds influence thinking and conclusions.
Promoting nature: To acknowledge that humans are part of nature; and to respect the needs and rights of other species and of nature itself in order to restore and regenerate healthy and resilient ecosystems.	Problem framing: To formulate current or potential challenges as a sustainability problem in terms of difficulty, people involved, time and geographical scope, in order to identify suitable approaches to anticipating and preventing problems, and to mitigating and adapting to already existing problems.
Envisioning sustainable futures	**Acting for sustainability**
Futures literacy: To envision alternative sustainable futures by imagining and developing alternative scenarios and identifying the steps needed to achieve a preferred sustainable future	Political agency: To navigate the political system, identify political responsibility and accountability for unsustainable behavior, and demand effective policies for sustainability.
Adaptability: To manage transitions and challenges in complex sustainability situations and make decisions related to the future in the face of uncertainty, ambiguity and risk.	Collective action: To act for change in collaboration with others.
Exploratory thinking: To adopt a relational way of thinking by exploring and linking different disciplines, using creativity and experimentation with novel ideas or methods.	Individual initiative: To identify own potential for sustainability and to actively contribute to improving prospects for the community and the planet

2 Methods

2.1 Semi-structured interviews with lecturers

For an in-depth understanding of the courses taught in the SISSTEM Bachelor program, we have conducted semi-structured interviews with the course lecturers. The respondents were first given an explanation of the goal of the research and some background on the GreenComp Framework, stressing that we wanted to evaluate the courses based on that GreenComp framework, but that it was not an evaluation of the courses, nor of the lecturers themselves. Next, the respondents were shown the definitions of the GreenComp competences and were asked to score on the spider graph (Figure 1) how well these competences were taken into account in their course. They were also asked to explain their score and to provide insight in the way the courses were taught, the exercises presented to the students, the examples used in the class room, etc. In total 15 semi-structured interviews were conducted and 22 out of the 27 SISSTEM courses taught at the University of Aruba were scored. These are marked in green in Table 2.

Courses in the first Bachelor year (Ba1) provide the scientific knowledge foundation of the students. “Principles of sustainability and SDGs” and “Integrative project in sustainable

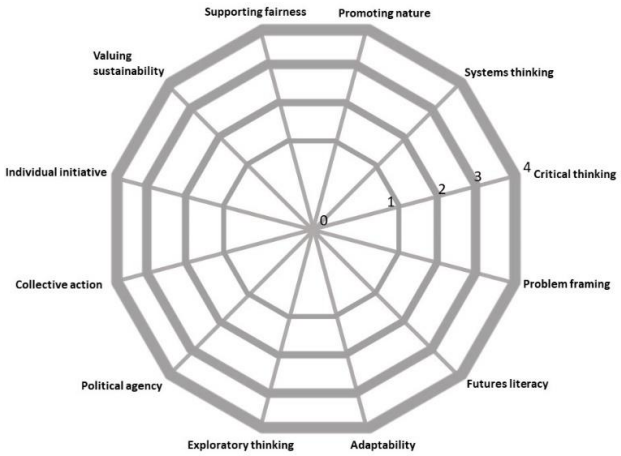

Figure 1: Empty spider graph as presented to the respondents. Scoring system: 0 = competence not taken into account, 1= competence slightly taken into account, 2 = competence partly taken into account, 3 = competence taken into account, and 4 = competence taken well into account.

development" are developed in line with ESD principles. In "Principles of sustainability and SDGs" students get an introduction to the concept of sustainability, sustainable development and the SDGs and the related global and SIS challenges. In "Integrative project in sustainable development" students learn how to integrate the knowledge on SD and how to apply it to the analysis of contemporary problems faced by SIS in the Caribbean. The students work on real-life sustainability problems and collaborate with key stakeholders. In the second year of the Bachelor program (Ba2), the students further develop their scientific and engineering knowledge, both generally and within their specialization.

Table 2: SISSTEM bachelor curriculum[30]. Courses evaluated by the lecturers are marked in green.

	Semester 1		Semester 2	
Ba1	Principles of sustainability and SDGs		Integrative project	
	Mathematics 1	Basics of physics	Mathematics 2	Applied Biological Sciences
	General chemistry	Geosciences	Introduction to informatics	Physics: electromagnetics
Ba2	Environmental sciences		Elective courses within specialization	
	Bioorganic chemistry and biochemistry	Bio-economics		
	Materials engineering	Mathematics 3		
Ba3	Lab work specialization		Environmental law and policy	
			Entrepreneurship, Innovation & Society	
	Specialization at host institute		Interdisciplinary and multidisciplinary approaches to sustainable development	
			Thesis	

Elective courses Bio-environmental sciences	Ecophysiology
	Environmental Chemistry
	Socio-Ecological Systems
Elective courses Information & Data sciences	System and Control Theory
	Machine learning
	Software Project Management
Elective courses Technology and Engineering	Chemical and Environmental Separation Processes
	Sustainable Energy Production
	Automation and Process Control

While the majority of the courses taught in the second year are more traditional courses focusing on their STEM knowledge and skills, some courses bring about the further development of the ESD skills and competences, including Environmental Sciences, Socio-ecological systems and Sustainable Energy Production.

In the first semester of the third Bachelor year (Ba3), the students spend one semester at a host institute, where they can further specialise within their chosen track, both through courses and laboratory/field work experience. Finally, in the second semester of Ba3 "Environmental Law and Policy" and the thesis project are aiming at knowledge expansion and at the same time at improving ESD competences. In "Interdisciplinary and

[30] A detailed description of every course within the SISSTEM Bachelor program can be found in the Study Guide: https://drive.google.com/file/d/1a_LEi6fiurRjlB6-0cDKkgDmAfyG0jSU/view

Multidisciplinary approaches to Sustainable Development" (IMASD), the students learn to address sustainability challenges in Aruba through a research project in collaboration with local stakeholders. In "Entrepreneurship, Innovation and Society", the students are exposed to a wide variety of speakers from within and outside Aruba and develop their skills in debating and asking critical questions, sharing opinions, etc.

2.2 Survey with students

Besides the lecturers' point of view, we have also evaluated how the SISSTEM students' sustainability competences evolved over the course of their academic education. Therefore, we have conducted a survey with the Ba1 students at the start of the academic year 2022-2023 and with all SISSTEM Bachelor students at the end of the academic year 2022-2023. The survey was based on a survey that was developed by Eppinga *et al.* (2020). However, questions were slightly adapted and additional questions were added. As stated before, each of the competences defined in the GreenComp Framework is further detailed with a set of knowledge, skills and attitudes (KSA) statements. With every question asked in the survey, we evaluated whether this question could be matched with one or more of the KSA statements of the GreenComp Framework. For example one of the questions in the survey was to indicate the students' agreement on a 5-point Likert scale (Strongly disagree, Disagree, Neither agree nor disagree, Agree, or Strongly agree) with the following statement: "I think it is necessary that I change my current way of producing and disposing of waste". This question was then matched with the knowledge skills and attitudes statements (Table 3). Scoring was based on Eppinga et al. (2020) and ranged from 0 (strongly disagree) to 4 (strongly agree) for Likert-type questions, was 0 or 1 for sustainability-association questions, or 0 or 4 for knowledge-type questions[31]. We matched every question in the survey with the KSA statements. Next, we summed all scores per competence and then recalculated this score to a maximum score of 4.

Table 3: Example linking question to GreenComp competences and KSA statements

Competence	Knowledge, Skills, Attitude statements
Valuing sustainability	Is prone to acting in line with values and principles for sustainability
Supporting fairness	Is committed to decreasing material consumption
Futures literacy	Is aware that the projected consequences on self and community may influence preferences for certain scenarios above others.
Adaptability	Is willing to discontinue unsustainable practices and try alternative solutions.

3 Results

3.1 Training of sustainability competences throughout the curriculum

In this section, we present how the lecturers in the SISSTEM Bachelor program rate the extent to which the competences for sustainability as defined in the GreenComp Framework are being addressed in their specific course. Figure 2 presents the median of these scores in a spider graph for Ba1, Ba2, and Ba3 (8, 12 and 2 courses, respectively). In general, we observe progressively more attention for sustainability competences as the curriculum proceeds. Indeed, once the basic skills and traditional information and knowledge transfer have been established in the first part of the program, the curriculum focuses more room for the development of sustainability competences.

Ba1 shows a strong focus on critical thinking and problem framing. According to the lecturers, other competences such as promoting nature, valuing sustainability systems thinking, exploratory thinking and individual initiative are slightly taken into account. All other competences are almost not taken into account in the Ba1 courses. For Ba2, the

[31] Eppinga et al., "Putting Sustainability Research into Practice on the University Campus: An Example from a Caribbean Small Island State."

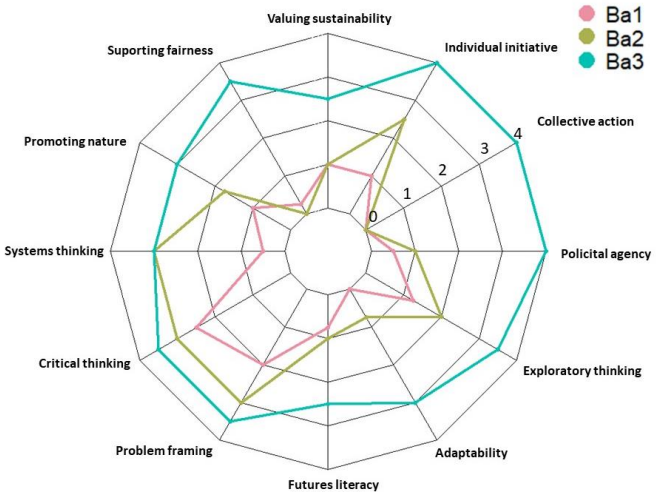

Figure 2: Median GreenComp competences score by the SISSTEM lecturers for Ba1, Ba2 and Ba3.

graph expands more to the outer circles, with an increase in focus on systems thinking, critical thinking and problem framing. During the first semester of Ba2 the students have very specific STEM courses, while in the second semester, the students receive specialization courses with a STEM focus, in line with the expectations. However, also individual initiative and exploratory thinking are partly taken into account during Ba2. For the Ba3 courses, the graph expands even further towards the outer contours of the spider graph and all competences are considered to be taken into account or to be taken well into account. In the second semester of Ba3, the students follow the course IMASD. Out of all courses, IMASD is the course that scores the highest average score (3.83) and total score (46).

Table 5 presents the median GreenComp competences' scores as judged by the SISSTEM lecturers for each bachelor year separately and together. Also, for each competence and bachelor year, the number of courses receiving a maximum score of 4 are indicated. We observe that all competences are covered maximally (score 4) at least once. Hence, a SISSTEM graduate has experienced all competences at maximal score in at least one course. We conclude that, according to the lecturers, all competences are recognized to the highest level throughout the entire Bachelor curriculum.

3.2 Student survey

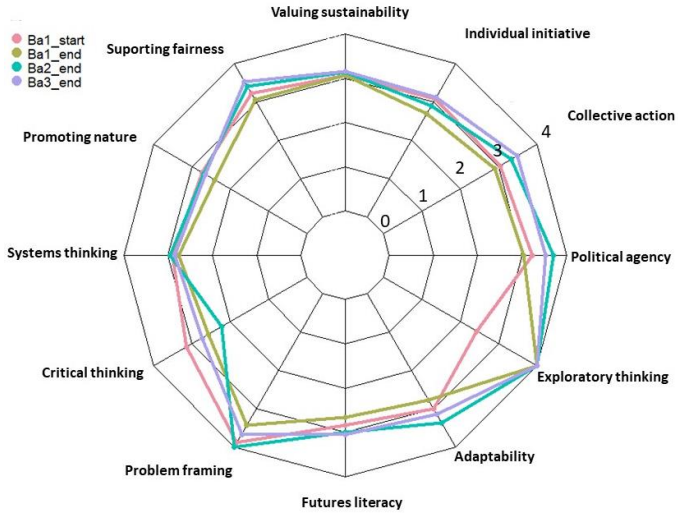

Figure 3: Student's score for the different competences based on the survey responses for Ba1 at the start of the academic year and Ba1, Ba2 and Ba3 at the end of the academic year.

The survey has been presented to Ba1 students at the start and to all students at the end of the academic year 2022-2023. Keeping only respondents that filled out more than 10% of the questions, 9 students filled out the survey at the start of the academic year (95%) and 15 at the end (84 % in Ba1, 90% in Ba2 and 93% in Ba3). Figure 3 shows the average students' scores on the Greencomp competences. Overall, the students score relatively high for all competences. Only the competence "exploratory thinking" shows an increase from the start of Ba1 to the end of Ba1. All other competences show no significant difference between the two survey

moments and groups. This means that, based on the survey, we cannot observe any evolution in students' competences.
Additionally, there are some counterintuitive observations. For example for critical thinking, whereby the Ba3 students' score is lower than the score of the Ba1 starting students[32], while this competency is highly scored by the lecturers (Table 5).
These results may result from the way of framing and scoring the questions, which could lead to shifting interpretations. For example, when asking the students whether or not they associate plastic, pesticides and pollution with sustainability, they score "1" if they state they do not associate this with sustainability and "0" if they state they do associate this with sustainability. As observed from Table 6, a majority of Ba3 students associate these terms with sustainability. We assume this is because they recognize these terms with having an impact on sustainability and therefore associating them with sustainability. If this assumption is correct, this would mean that the students do broaden their view on sustainability and do enhance their critical thinking, while this is not reflected in the current survey and scoring system.

4 Discussion and conclusion

ESD is receiving increasing attention, but the theory is not always applied into actual education programs[33]. Using GreenComp as guiding framework, we have investigated how ESD at higher educational level can be put into practice in a SIS context, more specifically within the SISSTEM program at the University of Aruba.
Overall, we found that, according to the lecturers teaching the different courses in the SISSTEM program, the different competences of the GreenComp framework are well taken into account and the students are being taught all intended competences at the highest level in at least 2 courses in the entire Bachelor curriculum (Table 5). The main competences with the highest overall scores as well as best the distribution throughout the entire program, are the competences in the area "Embracing complexity in sustainability" (Systems thinking, Critical thinking and Problem Framing) as well as Exploratory thinking. This is not surprising as the SISSTEM program is focused on STEM engineering education. Some competences with lower scores may need extra attention though, including Collective action; Adaptability; and Supporting fairness. This was also recognized by the lecturers during the interviews. Some lecturers stated that discussing the GreenComp framework competences gave them new ideas on how to include new exercises, assignments or examples in their classes. While the GreenComp framework in itself does not provide a specific method to evaluate curricula on their competences, we believe it to be very useful and comprehensive as guiding framework. The method used with the spiderweb as interview guide and the scoring for the different competences of the framework was really helpful in letting the SISSTEM lecturers conduct a self-reflection on their course(s) and on the SISSTEM Bachelor program as a whole.
The results obtained from the lecturers' evaluation are, however, not reflected in the students' survey outputs. We conclude that the students survey developed was not sufficiently adequate to test the students' evolution in acquiring the GreenComp competences. Other studies that assessed ESD competences with students used scaled self-assessments; reflective writing exercises; scenarios/case testing; focus groups and interviews with students; performance observations; concept mapping; and regular course work evaluation[34]. We opted for the survey format as we thought this could be repeated

[32] We leave out Ba2 out of the discussion as this is based on the answers of only 2 students.
[33] Nazir, "Knowledge Is Not Enough: Reimagining Environmental and Sustainability Education in the Caribbean as Environmental Conciousness Raising."
[34] Redman, Wiek, and Barth, "Current Practice of Assessing Students' Sustainability Competencies: A Review of Tools."

yearly, allowing for the collection of longitudinal data and the continuous assessment and improvement of the curriculum.

Table 4: Overview of mean and median GreenComp competences scores as judged by the SISSTEM lecturers as well as the students' scores from the surveys.

Competence	Ba1			Ba2		Ba3		All years	
	Median score lecturers (nr courses with max score of 4)	Mean score students start	Mean score students end	Median score lecturers (nr courses with max score of 4)	Mean score students end	Median score lecturers (nr courses with max score of 4)	Mean score students end	Mean score lecturers	Number of courses with courses max score of 4
Collective action	0 (0)	3.04	2.9	0 (0)	3.33	4 (2)	3.50	0.75	2
Adaptability	0 (0)	3.00	2.77	0.75 (2)	3.38	3 (0)	3.15	1.07	2
Supporting fairness	0.25 (0)	3.22	3.06	0 (1)	3.40	3.5 (1)	3.53	1.09	2
Political agency	0.5 (0)	3.22	3.03	1 (0)	3.7	4 (2)	3.53	1.25	2
Valuing sustainability	1 (0)	3.07	3.07	1 (3)	3.13	2.5 (1)	3.16	1.43	4
Futures literacy	0.75 (0)	2.83	2.67	1 (0)	3.00	2.5 (1)	3.06	1.45	1
Individual initiative	1 (0)	3.09	2.68	2.5 (2)	2.89	4 (2)	3.11	1.91	4
Promoting nature	1 (0)	2.73	2.40	1.75 (3)	2.68	3 (1)	2.63	1.91	4
Exploratory thinking	1.25 (2)	2.44	4	2 (4)	4	3.5 (1)	4	2.14	7
Systems thinking	0.5 (3)	2.91	2.76	3 (6)	2.96	3 (1)	2.84	2.30	10
Critical thinking	2.5 (2)	3.13	2.57	3 (3)	2.21	3.5 (1)	2.74	2.5	6
Problem framing	2 (0)	3.89	3.43	3 (4)	4	3.5 (1)	3.67	2.48	5

Table 5: Percentage of respondents associating pollution, pesticides and plastic with sustainability.

Program students	Pollution	Pesticides	Plastic
Ba1 start academic year	22%	22%	33%
Ba1 end academic year	14%	14%	29%
Ba2 end academic year	50%	0%	0%
Ba3 end academic year	83%	50%	83%

A reason for the non-conclusive results of the survey might be that the Ba3 students interpreted the survey questions differently than the Ba1 students at the start of the academic year, obviously a consequence of their own broadening insights. Therefore, we need to modify the survey in order to be able to take into account and even test this progress in insight and mindset of the students throughout the program. Furthermore, in future survey, we plan to include more questions to test the growing understanding of the island context and the specific sustainability challenges of SIS and testing all students both at the start and at the end of the academic year. We remain convinced that a student survey can help in testing the growing competences of the students throughout the curriculum, but more effort is needed to develop a more suitable survey that takes into account the shifting mindsets of the students during their studies. We also consider to combine the student survey with other, likely more time-consuming, evaluation methods.

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