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Working Group on Schools, Sub-group on Education for Environmental Sustainability

Input Paper: Assessing Student Competences in Sustainability



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Assessing Student Competences in Sustainability

Input Paper

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1. Introduction

Assessment is at the heart of effective teaching. It is the bridge between teaching and learning, as it is through assessment that we can understand whether what has been taught has been learnt¹. Understanding the role of assessment, as well as the value and suitability of different assessment approaches, are critical to the attainment of competences in Learning for Sustainability (LfS). It has been argued that some forms of student assessment hinder the introduction of innovative educational practices and the development of innovation skills in education systems²; a relevant consideration for those seeking to address LfS in schools.

This input paper for EU Working Group on Learning for Sustainability aims to clarify the context and the framing of sustainability competences and the implications of these for assessment in schools. It considers current and emerging practice and asks which assessment approaches and tools are needed to accommodate the transformative edge that LfS brings. The paper is underpinned by a literature review on assessment, with a focus on sustainability competences of students and learners of school age. Recognising that the purpose of an assessment generally drives the way it is designed and often what is taught, the paper reflects on the diverse assessments methods and approaches that align with *student competences* and learning outcomes, building on the EU sustainability competence framework GreenComp³. The paper also discusses the *influence of technology on assessment* the possibilities offered by digital innovations for assessing LfS competences. The nature of assessment is changing as schools become increasingly equipped with computers, tablets, and wireless internet access – as well as new technologies and software applications. Digital assessment systems typically offer an array of features that traditional paper-based tests and assignments are unable to offer and creating new possibilities for the assessment of LfS. These are worthy of consideration as they change not only the medium of assessment but also what it is possible to assess.

2. Practice

2.1 Assessing Learning for Sustainability in Schools

Assessment is understood as a process, method, or tool that educators use to evaluate, measure and document the learning progress in relation to academic understanding, skills acquisition, and/or educational needs of students⁴. The term ‘assessment’ often conjures up images of traditional pen and paper testing and standardised tests that either compare performance in large populations of students or those seeking to document end of course or topic attainment. These forms of assessment are usually referred to as *summative assessment*. However, educators have at their means a diverse array of assessment tools and methods to measure not just attainment, but also individual student learning needs. The latter, often referred to as *formative assessment*, is important if educators are to provide specialised academic support or education pathways. Figure 1 maps out different forms of assessment which align with specific purposes of assessment.

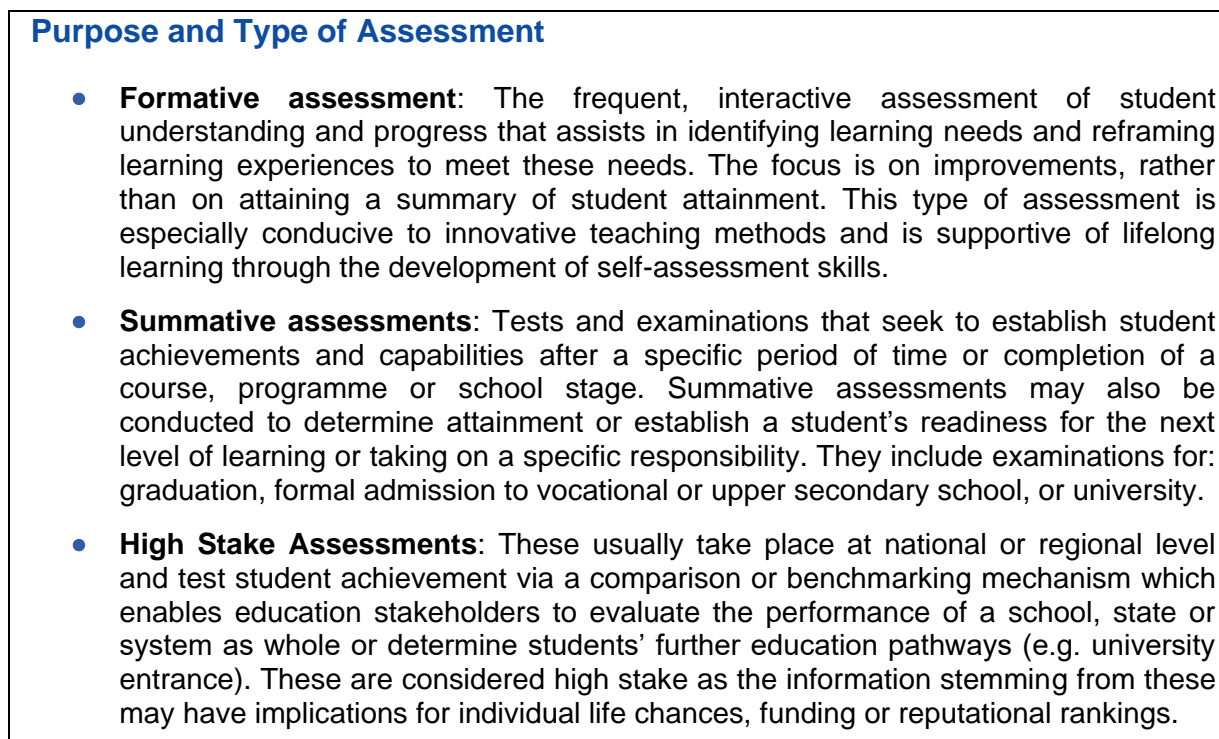
¹ Williams (2020)

² Looney (2009)

³ Bianchi et al (2022).

⁴ Great Schools Partnership (2015)

Figure 1: Purpose and Type of Assessment⁵



The assessment of students' learning in sustainability is complex when one considers that teaching and learning for sustainability does not typically take place solely within one subject/area of the curriculum or indeed a specific classroom or outdoor learning space in a school. Whole-school approaches to sustainability underpin its delivery as it seeks to be part of the lived as well as taught experience in schools. This multi-dimensional aspect of LfS, and the holistic learning experience it is seeking, do not always align with the narrow, subject-centred, and cognitive focus to assessment implemented in schools. It may explain why few countries in Europe have made formal commitments to assess student learning for sustainability⁶. Examples can be found of state examinations that do quantify environmental knowledge acquisition⁷ related to environmental science or studies but not the learner competences which are increasingly recognised as critical to this agenda.

An OECD policy paper on student assessment highlighted how some forms of assessment can be an obstacle to the introduction of innovative practices in education, particularly the development of social and action competences which are generally omitted from the scope of existing assessments⁸. It has long been recognised that assessment practices influence *what is taught* and *how it is taught*. The literature points to a lack of experience and confidence in the design of assessments that evaluate empowerment or action competence in learners⁹. Current assessment practices are focused on the 'learning to know' and not on the 'learning to be' or 'learning to do' – as framed by Delors and reflected in the UNECE's *Education for Sustainability* competency framework¹⁰.

⁵ Adapted from Looney (2009)

⁶ European Commission, Directorate-General for Education, Youth, Sport and Culture (2022).

⁷ For example, in Estonia, where national exams for upper secondary schools cover environmental sustainability content and assess knowledge in this area. Source: European Commission, Directorate-General for Education, Youth, Sport and Culture (2022).

⁸ Looney (2009)

⁹ Mula and Tilbury (2023)

¹⁰ UNECE (2009)

2.2 Assessing Sustainability Competences

“Sustainability competences can help learners become systemic and critical thinkers, as well as develop agency, and form a knowledge basis for everyone who cares about our planet’s present and future state” - European Commission (2022)¹¹

Sustainability competence frameworks map the learner outcomes sought from sustainability education experiences. Multiple frameworks exist mostly centred around competences in: systems-thinking; futures thinking; critical reflection; values-positioning; interpersonal engagement; and agency skills. These competences have been the source of much interest and debate in recent years¹² and efforts to translate these into school practice have now begun¹³.

The EU sustainability competence framework GreenComp (2022) consolidates previous experience in this area and provides policymakers with a means of developing educational responses in support of the Green Deal. GreenComp fosters sustainability as a competence¹⁴, not solely a body of academic knowledge to be acquired and pushes the boundaries of traditional learner outcomes. Through four interrelated competence areas, the framework ‘promotes ways to *think, plan and act with empathy, responsibility, and care for our planet and for public health*’¹⁵.

GreenComp has extended educational debate regarding the most effective pedagogies for the development of these capabilities and has given rise to questions as to how these learner competences can be assessed effectively by teachers and schools¹⁶. The assessment of learner competences in sustainability is still in its infancy¹⁷, with studies or case studies primarily focused on higher education students¹⁸ where the assessment of graduate attribute or learner outcomes is more common practice.

Figure 2 summarises the results of a systemic review of assessment in higher education. Redman, Wiek and Barth¹⁹ undertook a study of practice in 2021, seeking to examine tools used for assessing sustainability competences in students. Their literature review was conducted for publications through the end of 2019, resulting in 75 relevant studies that detail the use of assessment tools. The study confirmed the dearth of literature on formal education and learners of school age but, through their analysis of tools, proposed a typology of eight assessment tools which fall into three meta-types (self-perceiving, observation, and test-based approaches).

Figure 2 : Assessing Student Learning²⁰

Tool	Brief Description
Scaled self-assessment.	<i>Students rate their own competence development based on a pre-determined scale.</i>
Reflective writing.	<i>Students respond in writing to prompts reflecting on their competence development.</i>
Scenario/case test.	<i>Students are presented with a case and asked to respond to competence-requiring prompts.</i>
Focus group/interview.	<i>Students respond to prompts, verbally reflecting on their competence development.</i>

¹¹ Bianchi et al (2022).

¹² Redman et al. (2020); Wiek et al. (2011); Brundiens et al. (2010); Barth and Michelsen (2013)

¹³ Mula and Tilbury (2023); Vesterinen and Ratinen (2023)

¹⁴ Bianchi et al (2022).

¹⁵ Bianchi et al (2022).

¹⁶ See for examples: Vesterinen and Ratinen (2023)

¹⁷ Waltner et al (2019) ; Redman et al. (2020)

¹⁸ See for example : Cebrián Bernat et al. (2019)

¹⁹ Redman et al (2021)

²⁰ Redman, Wiek and Barth (2020)

Performance observation.	<i>Students are evaluated while carrying out course activities in or out of the classroom.</i>
Concept mapping.	<i>Students are given a prompt and asked to create a two-dimensional image with nodes and connections (specific to systems-thinking competence).</i>
Conventional text.	<i>Students take a test which may include multiple choices or short answers linked to competences.</i>
Regular course work.	<i>Students complete regular course work which is analysed for evidence of competences.</i>

These tools are most relevant to upper secondary and tertiary level students. Literature on assessment of sustainability competences in primary schools is negligible. Although not focused on assessment, a very recent study identified approaches that align with sustainability competences in the context of the earlier years of schooling. The findings of this study, captured in Figure 3 below, could be helpful in guiding policy frames relating to the assessment of student learning outcomes at the primary school level.

Figure 3: Approaches to the Development of LFS Competences in Primary Schools²¹

Competence	Approach
Systems thinking competence	<ol style="list-style-type: none"> 1. Contextualise scientific concepts in the real world/ daily life 2. Teaching critical thinking skills 3. Challenge-based-learning 4. Sustainability as a framework (interdisciplinary approaches)
Futures thinking competence	<ol style="list-style-type: none"> 1. Drawing 2. Drama (role playing)
Action-oriented competence	<ol style="list-style-type: none"> 1. Empowerment 2. Interdisciplinary approaches
Values thinking competence	<ol style="list-style-type: none"> 1. Photo elicitation 2. Media education 3. Debate 4. Drama 5. Interdisciplinary approaches
Collaboration competence	<ol style="list-style-type: none"> 1. Cooperative learning 2. Discussion 3. Participation 4. Drama 5. Outdoor environmental education

²¹ Vesterinen and Ratinen (2023)

3. Possibilities: Learning for Sustainability

3.1 Possible Ways Forward

Given the lack of policy tools, studies, or documented experiences to guide assessment of student learning experiences for sustainability, new pathways need to be mapped to progress this agenda. To assist in defining relevant considerations for assessment, it is first necessary to translate competences into evidence points. Evidence points assist teachers and educators to identify what processes or specific performance outcomes they are looking for in assessment tasks. Once these are clarified, then the teachers and schools can make decisions on what would be appropriate assessment tools and approaches to collect this information. The continuing section considers the four GreenComp strands of competences, each in turn, and gives consideration to *what* and *how* to assess, in the context of school learning experiences.

3.2 Embodying Sustainability Values

The GreenComp Framework²² explains that ‘embodying sustainability values’ encourages learners to reflect on, and challenge, personal values and worldviews in terms of unsustainability. It encourages values clarification to uncover social influences and cultural bias. It invites learners to deconstruct socialised values, challenging them to become actively conscious of values which have been inherited, chosen, and/or socially embedded²³. It also calls for learning opportunities that encourage reflection and questioning – processes that lie at the heart of transformative practices. The need for learners to effectively engage in these processes is widely recognised in the authoritative sustainability education literature.²⁴

There are a variety of assessment tools that can be used in support of competencies related to sustainability values. These are outlined in Figure 4 and summarised below:

- Although, questionnaires are often used to determine values, or value changes, the validity of these tools for these purposes have often been called to question²⁵. Instead, assessment tools that record a process of reflection of change and give insights into a person’s thinking about their values, provides a more valid tool of assessment.
- Approaches that allow various points of evidence for triangulation and also record the journey (not just the outcome) document that deep consideration has been given to this process. These assessments go beyond the ‘tick box’ approach and allow the capture of evidence relating to how students have attained these learner outcomes.
- Values and values clarification competences can be developed through student debates of core environmental issues; drama and role-playing where multi-stakeholder perspectives are explored and analysis of TV or media adverts that can help learners uncover the layers of values that inform or shape how an event or situation is presented.
- In the primary years, values competence is built through dialogues between pupils and teachers and promoted through fairy tales, stories, or images²⁶. The use of photos in teaching values competences is also common in the early years of schools as it can invite students to express their own thoughts as well as the value positions of others, allowing for these to be discussed.²⁷

²² Bianchi et al (2022)

²³ UNECE (2009)

²⁴ Tilbury (2011)

²⁵ Henderson and Tilbury (2004)

²⁶ Levchyk et al. (2021)

²⁷ Swain and Mohanty (2021)

- *Dialogue* could be used not only to support the development of these competences but also for formative and summative assessment purposes and they enable educators to assess a learners ability to draw out, express, and/or justify value positions.

Figure 4: Embodying Sustainability Values

DESCRIPTOR	CRITERIA	CONSIDERATIONS	ASSESSMENT
What learning competence is sought?	What evidence is needed to assess competency?	What assessment considerations are relevant?	What tools and techniques are helpful?
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.	<p>Evidence that the learner holds specific values and is aware of these.</p> <p>Evidence that the learner can articulate their own values.</p> <p>Evidence of an understanding of what has informed their values.</p> <p>Evidence that the learner has engaged in a process of unpacking what everyday experiences, people, and situations have influenced/shaped these values.</p> <p>Evidence that the learner is reflecting in autonomous and authentic ways.</p>	<p>Assessment tools and formats that allow and demonstrate reflection should be adopted – including reflective writing; visual or written diaries; portfolios of everyday experiences.</p> <p>Assessments can be guided by questions that allow for open-ended responses and help to justify positioning.</p>	<p>Questionnaires are often used to determine the adoption of specific values or value changes (pre and post testing).</p> <p>Debates, role-playing and media analysis can help learners uncover the layers of values that they and others hold.</p> <p>Diaries that record a process of reflection and provide insights into a person's thinking and what everyday experiences shape, challenge, or reinforce these values.</p> <p>Visual or written pieces of work that record the journey. Each journey should be unique given that life experiences vary.</p> <p>Dialogue stimulated by stories or images that encourage values communication and clarification.</p>
To support equity and justice for current and future generations and learn from the previous generations for sustainability.	<p>Evidence that the learner understands the concept of equity and justice and can provide examples of how they apply it to their lives.</p> <p>Evidence that the learner has sought to engage with the perspectives of others from previous generations.</p> <p>Evidence that the learner has sought to understand issues which will be faced by future generations.</p>	<p>Assessments that reflect an understanding of perspectives and viewpoints different to their own.</p> <p>Assessments that clarify their positioning on equity and justice.</p>	<p>Standard pen and paper tests can be used to assess these competences.</p> <p>Alternative forms of assessment may include composing a poem or drafting a drama scenario where relevant conversations and issues are captured.</p> <p>Role playing and reproducing Mock-Parliamentary or UN processes enable students to demonstrate competences in this area.</p>
To acknowledge that humans are part of nature; and to respect the needs and rights other species and nature itself to restore and generate healthy and resilient ecosystems.	Evidence that these concepts are understood and why they are important.	Assessment is looking for justification but also examples of how these concepts are applied in practice and their lived experience.	<p>Photo analysis can help learners articulate and explain these value positions.</p> <p>Reflective writing, artwork and student presentations can be used to collect evidence for assessment of learners' values.</p>

3.3 Embracing Complexity in Sustainability

This competence area is concerned with empowering learners with critical and systemic thinking skills as well as encouraging them to reflect on how to better assess information to challenge unsustainability²⁸. GreenComp sees systems thinking as necessary to understand complex sustainability problems, avoid oversimplification, and effectively address these. It requires learners to recognise systems by identifying interconnections and responses as well as framing challenges in ways that help them understand scale and impact²⁹. Learners are expected to be aware of the social impact of technological change and globalisation and how these have scaled up climate change, loss of biodiversity, influenced health and lifestyles, as well as consumerism and economic activities.³⁰

To demonstrate attainment in this area, learners need to not only know what a system is but also approach a problem through a systems approach considering time, space, and context in order to understand how elements interact³¹. Assessments that involve *concept mapping*, *case study analysis*, and *visual representation of systems* help identify learner competences in this area.

Critical thinking, a key sustainability competence is defined as the ability to assess information and arguments, identify assumptions, challenge the status quo, and reflect on how personal, social, and cultural backgrounds influence thinking and agency³². Critical thinking is a high-level cognitive process, which involves scanning, evaluating, and repositioning information relating to sustainability issues³³. Assessment of this competence will require creating opportunities for learners to demonstrate that they have reviewed and interrogated information and information sources and identified influences that shape perspectives. If a learner is in possession of critical thinking competences they will be able to question and, in some cases, challenge what is presented. For example, they will have the ability to articulate and recognise 'greenwashing'. *Case study reviews*, *advert analysis*, and *reflective writing* can help students not only develop these competences, but also provide a means for teachers to assess the development and attainment of these competences. *Student portfolios* or *journals*, that capture how sustainability is relevant to their everyday lives and lifestyle choices, are also considered to be effective tools for assessing sustainability learning outcomes³⁴.

²⁸ Bianchi et al (2022)

²⁹ Bianchi et al (2022); Sterling (2004); Tilbury (2011)

³⁰ Bianchi et al (2022)

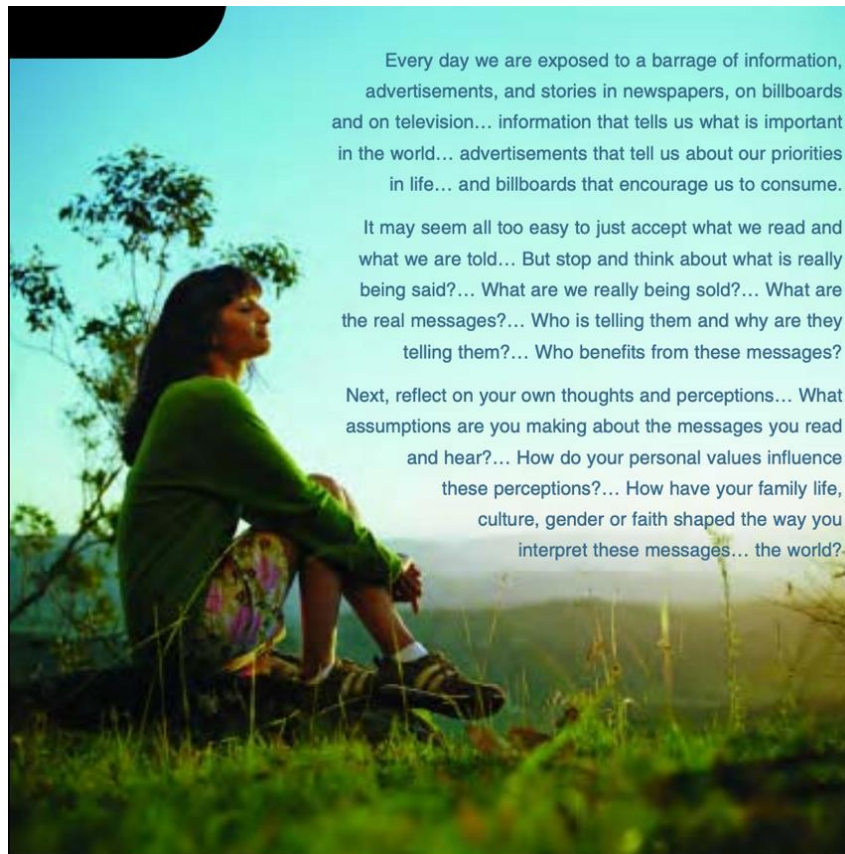
³¹ Bianchi et al (2022)

³² Bianchi et al (2022)

³³ Tilbury (2021); Tilbury and Wortman (2004)

³⁴ Tilbury and Wortman (2004)

Figure 5: Critical thinking in everyday life.³⁵



In asking and seeking to address the questions presented in figure 5 through a journal or portfolio, learners become more responsible and actively cooperate in creating a sustainable world. More specifically, stepping up critical thinking will help them go beyond just passively understanding sustainability concepts.

GreenComp also considers problem framing as a key competence which involves defining and structuring sustainability problems based on their complexity. Experts have identified different types of problems based on how well defined both the problem and solution are, differentiating between these can help identify appropriate solutions³⁶. In essence, problem framing helps define goals and the direction of the problem-solving process, helping students understand how individual actions influence the problem. It is best developed through an iterative learning process that promotes both the conceptual and practical aspects of sustainability literacy.³⁷

Authentic assessment techniques are most relevant to the development of this set of competences. It requires application of what students have learned to a new situation, and demands judgment to determine what information and skills are relevant and how they should be used (see

Figure 6). Authentic assignments often focus on messy, complex, real-world situations and require learners to interrogate but also negotiate with multiple sources of information or perspectives³⁸, these abilities underpin this set of competences and are identified by GreenComp as 'Embracing Complexity'.

³⁵ Tilbury and Wortman (2004)

³⁶ Bianchi et al (2022)

³⁷ Tilbury and Wortman (2004)

³⁸ Center for Innovative Teaching and Learning (2023)

Figure 6: Authentic Assessment: How does it differ from standard tests?³⁹

Standard tests	Authentic assessment	Indicators of authenticity
Require correct responses.	Requires an answer and a quality justification.	Correctness is not the only criterion; students must be able to justify their answers.
Must be unknown to the learner in advance to be valid.	Should be known in advance to learner as much as possible.	The tasks and standards for judgment should be known or predictable.
Disconnected from real-world contexts and constraints.	Grounded in real-world contexts and requires the learner to 'do' the subject.	The context and constraints of the task are like those encountered by practitioners in the discipline.
Contain items that isolate particular skills or facts.	Are integrated challenges in which a range of skills and knowledge must be used in coordination.	The task is multifaceted and complex, even if there is a right answer.
Include easily scored items.	Involve complex tasks for which there may be no right answer, and that may not be easily scored.	The validity of the assessment is not sacrificed in favour of reliable scoring.
Are "one shot"; students get one chance to show their learning.	Are iterative; contain recurring tasks.	Students may use particular knowledge or skills in several different ways or contexts.
Provide a score.	Provide usable diagnostic information about students' skills and knowledge.	Designed to improve future performance. Assessment results inform the learner of their progress.

Examples of authentic assessments include diaries and journals, writing a newspaper article, performing a dance or drama, designing a digital poster, show and tell presentations, or doing mini projects that involve activities at home. This form of assessment is characterised by open-ended tasks that require learners to construct extended responses, to perform an act, or to respond to real-world contexts or situations⁴⁰.

Authentic assessment differs from standard testing in a number of ways and have several advantages over conventional assessment. Firstly, they are likely to be more valid than conventional tests, particularly for learning outcomes that require higher order thinking skills, as they involve real-world contexts⁴¹. Studies have shown that they are more interesting for learners as they can see the relevance of the tasks at hand, which can serve to motivate their engagement⁴². They also can provide specific and usable information about what students have succeeded in learning as well as what they have not learned. It is important to acknowledge, however, that authentic assessments are more demanding of assessors' time; for those with limited experience of these, they are also more difficult to grade.

Despite these teacher-assessor challenges, authentic assessments are seen as increasingly needed to effectively assess sustainability learning. In Ireland, for example, a recent consultation undertaken by the National Council for Curriculum and Assessment (NCCA) concluded that teachers' efforts to assess students taking action, systemic and critical thinking around 'wicked problems' required the use of blogs, journaling, portfolios and other methods usually associated with authentic assessment. It called for the cataloguing of skills development through the use of project work and long-term engagement with particular issues. The report points to the need for opportunities for demonstrating critical thinking competences and how these can arise. Examples suggested included sustainable fashion shows, videoclip recordings, creation of an artistic expression, action projects, that document how they embrace responsibility and take action themselves.

³⁹ Adapted from Centre for Innovative Teaching and Learning (2023) and Wiggins (1998).

⁴⁰ University of Hull (2023)

⁴¹ Centre for Innovative Teaching and Learning (2023)

⁴² Centre for Innovative Teaching and Learning (2023)

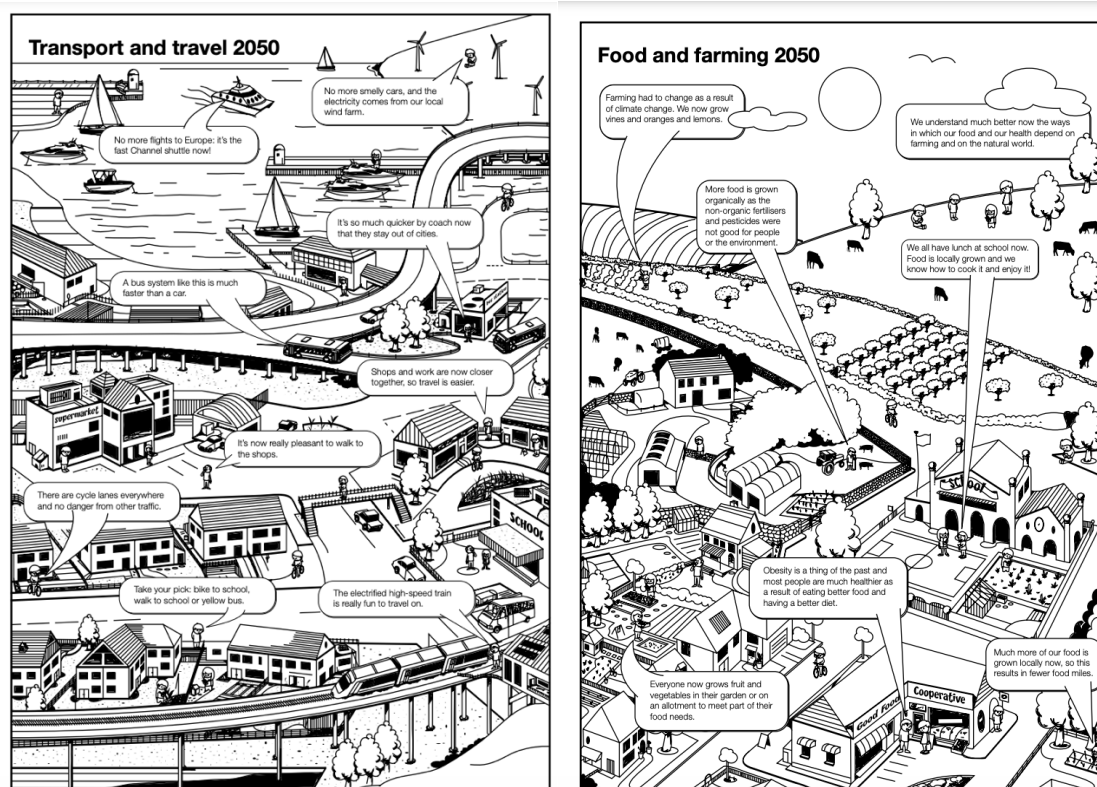
Figure 7: Embracing Complexity in Sustainability

DESCRIPTOR What learning competence is sought?	CRITERIA What evidence is needed to assess competency?	CONSIDERATIONS What assessment considerations are relevant?	ASSESSMENT What tools and techniques are helpful?
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.	<p>Evidence that the learner understands what a system is and what properties and relationships it exhibits.</p> <p>Evidence that learner understands factors and relationships.</p>	<p>Assessment tools and formats that allow consideration of multiple factors and their relationship to demonstrate an understanding of the system.</p> <p>Assessment can be guided by the sharing of examples systems and requiring learners to map their own understanding and response (action).</p>	<p>Standard pen and paper assessments can be used to ask students to explain and define a system.</p> <p>Concept mapping exercises could be used to assess a learner's understanding of systems interactions.</p> <p>Case study assessment could be used where the learner is asked to review and demonstrate understanding of systems in the context of this experience.</p> <p>Diagrammatic representations can be used to demonstrate how a process works, and what happens if X occurs.</p>
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.	<p>Evidence of asking critical questions related to their everyday experience.</p> <p>Evidence of beginning to address these questions and identify responses or actions.</p> <p>Evidence that the students are reflecting in autonomous and authentic ways.</p>	<p>Assessment can be guided by questions that allow for open-ended responses and help to explore thinking.</p> <p>Assessment tools and formats that document reflection upon everyday experiences.</p>	<p>Spider diagrams: Analysis of everyday adverts – identifying critical questions to interrogate perspectives or lifestyle choices being promoted.</p> <p>Portfolios, journals, and diaries that help the learner question their everyday lives and lifestyle choices in relation to sustainability.</p> <p>Artwork or literature review works that record a process of critical reflection, asking questions that get to the root of the issues.</p> <p>Reflective writing and student presentations can provide evidence of understanding influence (social and other).</p> <p>Visual or written pieces of work that record the journey.</p>
Problem Framing: To formulate challenges as a sustainability problem in terms of difficulty, people involved, time, and geographical scope to identify suitable approaches to anticipating and preventing problems, and to mitigating and adapting to already existing problems.	<p>Evidence of identifying the type of problem and level of difficulty underpinning it.</p> <p>Evidence that the approach chosen to address the issue aligns with the nature of the challenge.</p> <p>Evidence that the learner knows how to anticipate and seeks to prevent problems.</p>	<p>Assessment tools and approaches that allow demonstration of particular issues and how learners would respond to them.</p>	<p>Focus group dialogues where learners can uncover the various aspects/components of the problem.</p> <p>Developing and presenting posters that succinctly present the nature of the problem and suitable approaches to address it.</p> <p>Troubleshoot a scenario with the information given.</p> <p>Bringing an item to school that helps them articulate their thinking and perspectives - 'show and tell' presentations.</p>

3.4 Envisioning Sustainable Futures

GreenComp identifies future literacy, adaptability and exploratory thinking as key LfS competences. At the core of these is the ability to think about the future constructively and positively with the learner, being able to go beyond current predictions and imagine possible alternative futures. The futures competences can be developed and assessed by *imagining futures using drama, drawing* as well as *envisioning techniques*⁴³ (see Figure 8). A study demonstrated how these learning tools proved effective in allowing pupils to develop their ability to think about the future and to project themselves into an alternative world. These techniques also enable learners to understand the temporal connections between past, present, future.⁴⁴ For decades, Hicks has studied the use and impact of futures education in primary schools in the context of learning for environmental sustainability and has developed resources to engage learners in envisioning better futures (see figure 9). Although his work does not directly address the issue of assessment, the learning for tomorrow activities he proposes can serve as useful assessment tools⁴⁵.

Figure 8: Hicks 2012-2050 in Our Community⁴⁶



These examples are used to encourage learners to construct their own vision of the community they live in and imagining practices in 2050. They can form the basis for the assessment of future competences.

⁴³ Tibury (2011); Tilbury and Wortman (2004)

⁴⁴ Julien et al (2018)

⁴⁵ Hicks (2012).

⁴⁶ Hicks 2012-2050

Figure 9: Envisioning Sustainable Futures

DESCRIPTOR What learning competence is sought?	CRITERIA What evidence is needed to assess competency?	CONSIDERATIONS What assessment considerations are relevant?	ASSESSMENT What tools and techniques are helpful?
Futures Literacy: To envision alternative sustainable futures by imagining and developing alternative scenarios and identifying the steps needed to achieve a preferred sustainable future.	<i>Evidence the learner has explored future scenarios.</i> <i>Evidence that learner has considered not just the likely future but also the preferred future.</i>	<i>The key words are 'Envision' and 'Explore'.</i> <i>Assessment tools and format that allow and demonstrate consideration of new and alternative scenarios, rather than just the most likely scenario, are important.</i>	Visual representations of the future through drawings, diagrams, photos, or flow charts. Role playing experiences that articulate visions and their impact. Portfolios that record a process of reflection and provide insights into a person's vision for the future. Future-casting and Back-casting to enable learners to connect future visions with activities and choices of today.
Adaptability: To manage transitions and challenges in complex sustainability situations and make decisions related to the future in the face of uncertainty and ambiguity.	<i>Evidence that the learner has made a decision despite the ambiguity and difficulty.</i>	<i>Important not to shy away from making a decision.</i>	Focus group dialogues where learners can uncover the various aspects/components of the problem. Poster development and presentations learners articulate their issues.
Exploratory Thinking: To adopt a relational way of thinking by exploring and linking different disciplines, using creativity and experimentation with novel ideas or methods.	<i>Evidence that the learner is linking thinking.</i>	<i>This is where systems thinking combines with futures thinking.</i>	Envisioning exercises where learners imagine themselves in a particular scenario in the year 2030.

3.5 Action for Sustainability

Political agency, collective action and individual initiative underpin GreenComp's interpretation of what it means to act for sustainability. This framing is helpful as action-taking is perhaps the most complex, and certainly the most unique, of the LfS competences. The competence is underpinned by notions of empowerment⁴⁷ and requires learning environments and activities that develop children's responsibility, engagement, and ownership of their actions. They develop from learners being motivated and inspired to take action⁴⁸ as well as from opportunities for collaborative learning, participation and reflection. Some educators have used *motivational games*, *life observations*, *exercises with pictures*, *individual research projects* and watching and discussing *multimedia content*⁴⁹ to generate responses from stu-

⁴⁷ Solís-Espallargas and Morón-Monge (2020)

⁴⁸ Vesterinen and Ratinen (2023)

⁴⁹ For example, the digital civics toolkit <https://www.digitalcivicstoolkit.org/>

dents⁵⁰. It is argued that when learning is active, grounded, and situated, learners develop the abilities needed to take action for sustainability⁵¹. Furthermore, when the arts and sciences are brought together in context, learners develop the capability to engage actively in addressing issues⁵². *Self-assessment* is highly relevant in this context, as it enables learners to determine if they have effectively framed an action and whether they have learnt anything from the experience of taking action.

Figure 10: Acting for Sustainability

DESCRIPTOR	CRITERIA	CONSIDERATIONS	ASSESSMENT
<p>What learning competence is sought?</p> <p>Political Agency: To navigate the political system, identify political responsibility and accountability for unsustainable behaviour, and demand effective policies for sustainability.</p>	<p>What evidence is needed to assess competency?</p> <p>Evidence that the learner understands the political system and what properties and relationships it exhibits.</p>	<p>What assessment considerations are relevant?</p> <p>The word 'consider' is key to this set of competences.</p> <p>Assessment tools and formats should be adopted that allow and demonstrate consideration of multiple factors depicted and their relationship to each other.</p>	<p>What tools and techniques are helpful?</p> <p>Multiple choice to assess understanding of political system.</p> <p>Artwork that is supported by reflective writing.</p> <p>Assessment approaches that combine art and science considerations and allow for decision making and justification of actions.</p> <p>Computer Simulations and Games that provide opportunities to see through different actions and their impact.</p>
<p>Collective Action: To act for change in collaboration with others.</p>	<p>Evidence of an understanding of what has informed their values and concrete actions.</p>	<p>Assessment can be guided by the sharing of examples, systems, and requiring learners to map their own.</p>	<p>Observation that allows assessors to watch and review the interaction in a group context.</p> <p>Role playing that helps them visualise themselves as action takers and gives them opportunity to demonstrate their action competences.</p>
<p>Individual Initiative: To identify own potential for sustainability and to actively contribute to improving prospects for the community and the planet.</p>	<p>Evidence that the learner has engaged in a process of unpacking their strengths and identifying areas of further learning</p> <p>Evidence that the students are reflecting in autonomous and authentic ways.</p>		<p>Self-evaluation where learners are given the opportunity to explain their thought processes, justify, and evaluate the impact of their actions.</p>

⁵⁰ Levchyk et al. (2021)

⁵¹ Vesterinen and Ratinen (2023)

⁵² Bassachs et al. (2020).

4. Possibilities: Digital and New Technologies

4.1 The Digital Transition

“Students and parents know there is more to a sound education than picking the right answer on a multiple-choice question or answering an extended-response question outside of the context of students’ daily lives. All learners deserve assessments that better reflect what they know and are able to do with that knowledge... The shift from traditional paper and pencil assessments to next generation digital assessments enable more flexibility, responsiveness and contextualisation.”⁵³

[\(https://tech.ed.gov/netp/assessment/\)](https://tech.ed.gov/netp/assessment/)

The nature of assessment is changing as schools become increasingly equipped with computers, tablets, and wireless internet access as well as new technologies and software applications. Digital assessment systems typically offer an array of features that traditional paper-based tests and assignments are unable to offer and creating new possibilities for the assessment of LfS competences. These are worthy of consideration as they change not only the medium of assessment but also what it is possible to assess.

The medium of technology can also change or extend the nature of teacher and learner interactions, enabling educators to gather evidence of learners’ thinking and abilities during the learning process and to provide real-time feedback through learning dashboards. The latter enable families to be kept abreast of how learners are doing in schools and informing parents of areas where students need support at home⁵⁴. They not only assist in providing timely feedback but can also provide a more nuanced picture of student abilities and needs than can traditional assessments, allowing educators to personalise learning⁵⁵. For example, video capture can help document and better assess learners’ ability to engage in teamwork and collaboration. They also provide new avenues for self-reflection, peer reflection and feedback as the material can be used to initiate conversations with the learner or learners about their competences.

It is argued that continued advances in technology will blur the boundaries between formative and summative assessment and lead to embedded assessments that are less disruptive and more helpful to improving learning⁵⁶. These advances also ensure that all students have the best opportunity to demonstrate their knowledge and skills and focus on real-world skills, applicability, and demonstration of competences. However, the improvements will only take place if teachers have appropriate access and training to support their adoption.

The US Department for Education recognises that digital and new technologies can help reframe assessment in a number of ways. Firstly, they enable testing to be situated in real-world environments, where students perform tasks, or include multi-stage scenarios that simulate authentic engagement with issues. New technologies also enable the embedding of assessment in daily tasks enabling teachers to access information on student learning throughout the school day; this in turn leads to the personalisation of learning and to interventions to address particular needs (see Figure 11). However, these developments require significant preparation for schools and

⁵³ <https://tech.ed.gov/netp/assessment/>

⁵⁴ Department of Education, US (2022)

⁵⁵ Sibberns (2020).

⁵⁶ Sibberns (2020).

teachers so that ethical considerations, data protection and appropriate teacher engagement takes place to ensure fairness and sound judgement in student learning⁵⁷.

Figure 11: Future of Assessment⁵⁸



5. Priorities

5.1 Policy Priorities

Evidence collected during the preparation of this input paper suggests that policy-makers, educational think-tanks and expert groups struggle with identifying how best to assess sustainability competences. This lack of clarity can also be found in the wider educational debates about evaluating learner’s abilities. These debates, in turn, feed into calls for a

⁵⁷ Rina et al (2020)
⁵⁸ Department of Education, US (2022)

rethink of assessment practices and support for alternative forms of assessment that capture diverse ways of knowing, learning and acting.

A key priority going forward is to promote multiple measures of student learning and performance to evaluate learner competences in sustainability, which include *authentic assessments* modes and *embedded digital assessment*. These new ways of assessing learning will enable learners to be empowered and not just compared.

However, there are no formal guidance frameworks that can be used to support teachers with this task. Stepping-stones are needed to be put in place to allow effective assessment of learner competences in sustainability. This could consist of defining and trialling specific evidence points so that teachers know what to look for when assessing competences. The development of teacher skills in participatory assessment techniques and tools that support educational innovation are also needed. School teachers and experienced assessors should also be engaged in illustrating examples specific to the assessment of sustainability competences. At another level, a rethink of teacher education, curriculum development, and educational standards is required so that these newer forms of assessment can be embedded in school practice.

Policy work could give further consideration to the following questions:

1. How can we transition current forms of assessment to *authentic assessment* and *embedded digital assessment* approaches that support learner sustainability competences building on GreenComp?
2. What policy and structural conditions facilitate these shifts that can help mainstream the assessment of sustainability competences in school education?
3. How can we better align policy ambitions with practical assessment experiences on the ground and what tools can assist with these tasks?
4. How can the assessment of learners' sustainability competences best be developed through in-service and through continuous professional development?

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