European Commission

SCIENCE FOR POLICY BRIEF

From sustainability competences (*GreenComp*) to sustainable behaviour

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HIGHLIGHTS

- → *GreenComp* is the recently published European Sustainability Competence Framework, which identifies sustainability competences that learners need for a more sustainable society.
- → This policy brief uses behavioural insights and evidence to assess whether and how these sustainability competences can make learners behave in a more sustainable way, also pointing to potential education interventions to foster these competences.
- → *GreenComp*'s competences leverage several proven psychological drivers of sustainable behaviour, such as feeling responsible for sustainability challenges and solutions, and believing that one's actions matter.
- → *GreenComp*'s competences also address psychological barriers that evidence links to unsustainable behaviour, like the difficulty to think about the long-term consequences of our actions.
- → This review therefore confirms that equipping learners with *GreenComp*'s sustainability competences can contribute to a more sustainable society.

'GreenComp responds to the growing need for people to improve and develop the knowledge, skills and attitudes to live, work and act in a sustainable manner.' [1]

1. INTRODUCTION

What is *GreenComp*?

GreenComp[1] is the recently published European Sustainability Competence Framework. *GreenComp* captures a set of sustainability competences, which education policymakers can use for education and training curricula. GreenComp serves learners and educators in different ways, such as for sustainability (self-) assessment and reflection.

GreenComp features four sustainability competence areas: (1) embodying sustainability **values**, (2) embracing **complexity** in sustainability, (3) envisioning sustainable **futures**, and (4) **acting** for sustainability.

Objective and method of this policy brief

Can *GreenComp*'s competences really help learners behave in a sustainable way and, if so, how? Answering this question is the purpose of this report. To do so, a **behavioural sciences-based analysis of *GreenComp*** seems warranted. The reason is that *GreenComp* mainly takes an educational sciences perspective to identify sustainability competences, while the nature of its main ultimate goal (i.e., 'to help learners live, work and act in a sustainable manner') is behavioural.

To meet this objective, we use the following four-step methodology. We (1) first take *GreenComp*'s most relevant sustainability competences as a departure point, and (2) attempt to map them with **psychological drivers and barriers of sustainable behaviour**. To do so, we mainly rely on a classification of psychological drivers of sustainable behaviour (Figure 1) recently published in *Nature Sustainability*. We then (3) present the **behavioural sciences evidence** linking these drivers and barriers to sustainable behaviour. For the sake of brevity, we propose a non-exhaustive review focusing on the most pertinent evidence. Finally (4), when relevant, we also put forward **education interventions** inspired by the behavioural sciences, which can help educators further build on these drivers or address these barriers to sustainable behaviour.

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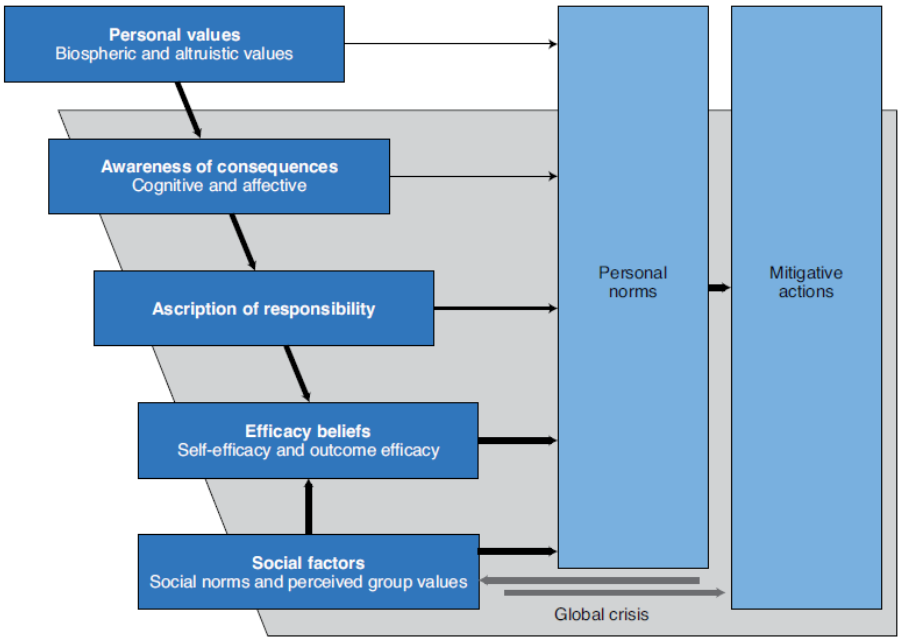
Figure 1 – Psychological drivers (dark boxes on the left side) of sustainable behaviour ('mitigative actions', last box on the right side)



Source: Bouman, Steg, & Dietz, Nature Sustainability, 2021[2].

2. VALUES: sustainability, fairness, nature

The first sustainability competence area identified in *GreenComp* is '**embodying sustainability values**'. These values encompass, among others, both respect for nature and fairness.

Equipping learners with these sustainability values has the potential to lead to more sustainable behaviour. Behavioural sciences evidence indeed shows that sustainability values ('*personal values*' in Figure 1) are a clear driver of sustainable behaviour [3, 4]. Individuals are more likely to behave sustainably when they hold **environmental values** (that is, caring for the environment and nature, also known as *biospheric values*) or **fairness values** (that is, caring for others and for social justice, also known as *altruistic values*). For instance, people with high environmental values tend to save more hot water in their household[5], and fairness values such as universalism and benevolence are associated with using public transport to commute to work[6]. Sustainability values are important because they can lead people to behave sustainably more consistently on the long term than if they are just motivated by other values[7].

Sustainability values may lead to more sustainable behaviour because people want to avoid feeling an unpleasant tension between their values and their actions, for instance when they choose a hotel[8]. Conversely, acting in line with one's sustainability values can increase **positive emotions** of pride and contentment[9].

In terms of education interventions, taking learners for **walks in natural spaces** (see Figure 2) has been shown to increase sustainability values[10].

Importantly, sustainability values are necessary, but **insufficient** to promote sustainable behaviour. Most people in the EU hold altruistic and environmental values[11, 12]. For instance, 77% of 15-year-old students in the EU agree that looking after the environment is important to them (see Figure 3). Yet, because of **habit and contextual constraints**, they do not consistently behave in line with these values[13, 14]. It is more difficult to act sustainably in line with sustainability values when the behaviour is 'costly', highly constrained and recurrent, for instance, biking to school when no safe cycle path is available.

Figure 2 – *Taking learners to natural environments can help increase their sustainability values*

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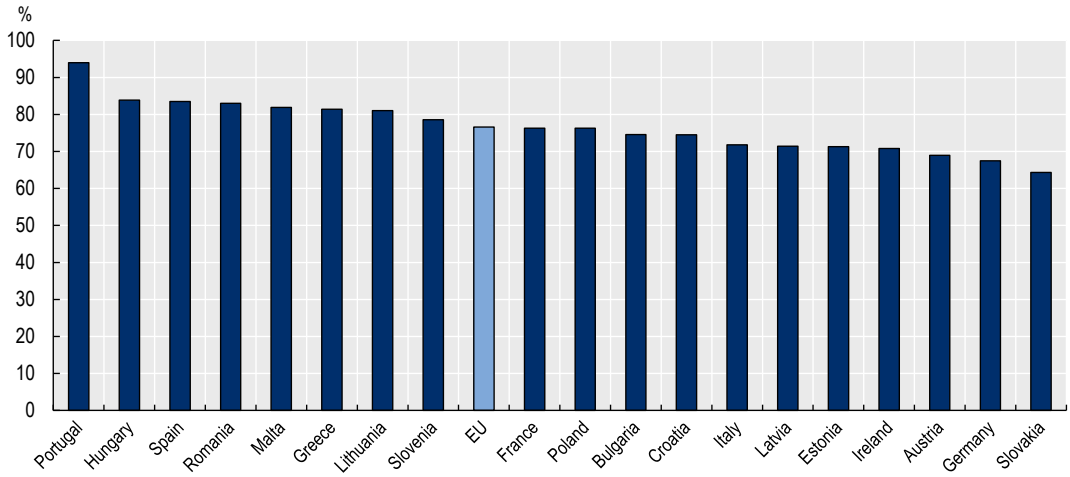
Figure 3 – *Share of students (15-year old) who 'agree' or 'strongly agree' that 'looking after the global environment is important' to them*



Source: OECD[15], 2018 PISA database. The list excludes EU countries that were not covered by the PISA study

3. COMPLEXITY: systems thinking, critical thinking, problem framing

GreenComp's second competence area is '**embracing complexity in sustainability**'. There is a wealth of behavioural evidence confirming the importance of complexity competences to foster sustainable behaviour.

This area is about empowering learners with (1) **systems thinking** (i.e., approaching sustainability problems holistically, integrating different angles of causes and consequences, and understanding their interactions), (2) **critical thinking** (i.e., being able to understand biases, to critically assess information, sources and arguments related to sustainability), and (3) **problem framing** (i.e., formulating sustainability problems and identifying suitable solutions).

Having these complexity competences increases the likelihood of behaving more sustainably, as they leverage several proven psychological drivers. Here, we focus on critical thinking given the available evidence on this specific competence. Being able to think systematically can lead to more sustainable behaviour because it is likely to increase learners' '**awareness of consequences**' (see the second box on the left on Figure 1). Systems thinking precisely allows learners to understand the long and multiple chains of causality[16] that eventually lead to sustainability problems, including the consequences of small actions. There is evidence that individuals who can think systemically about climate change are more likely to understand the value of ecosystems and to support sustainability policies, such as improving fuel consumption standards for cars[17]. Conversely, believing that social, environmental and economic problems are unrelated is associated with lower awareness of the risks[17] and consequences of climate change[18]. *GreenComp*'s system thinking competence includes understanding that 'every human action has environmental, social, cultural and economic impacts'. The more individuals are aware of these impacts, the more likely they have **personal norms** to behave more sustainably[2].

Figure 4 – *Catan: Oil Springs Scenario'*, a board game to increase system thinking in sustainability issues

Source: Chappin, Bijvoet, Oei, 2017[19]

One interesting education intervention proposed to help learners understand the complexity of sustainability issues is **gamification**. For instance, the board game[19] 'Catan: Oil Springs Scenario' (see Figure 4) promotes system thinking by letting learners experience the intertwinned economic, environmental and social consequences of oil consumption.

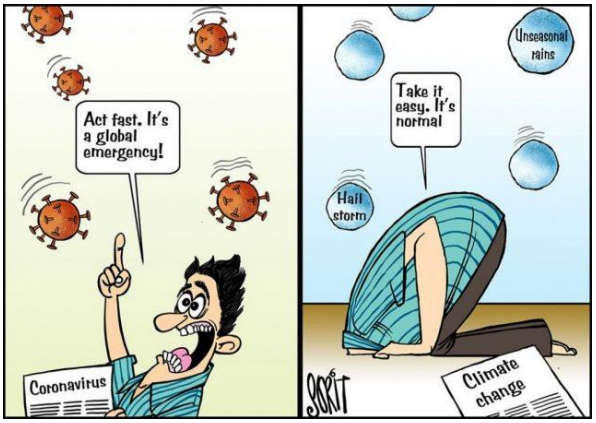
The evidence suggests that being aware of the consequences of one's actions is **necessary, but not sufficient** to behave sustainably[20]. For instance, having a high degree of systemic thinking and literacy regarding climate change does not necessarily lead to concern and, hence, to action[21]. Just like for sustainability values, this means that education interventions *do* need to equip learners with complexity competences that help them understand the consequences of their actions on sustainability, but they also need to equip them with all the other competences.

4. FUTURE: futures literacy, adaptability, exploratory thinking

GreenComp's third sustainability competence is about **embracing sustainable futures**. This competence mainly encompasses being able to envision alternative futures and the steps needed to achieve a preferred sustainable future. Other components include being able to adapt to, and detect uncertainty, ambiguity and risk related to alternative sustainability futures.

> *"This climate change is a threat that is 50, 100, 200 years away possibly. [...] the majority of people aren't going to be bothered about it, until it's clear and immediate. It's a long way off before it gets worse"*
> (*quote from a qualitative interview*[33])

Figure 5 – Covid-19 versus climate change



Several **interventions** have been put forward to stimulate future thinking in order to promote more sustainable behaviour. For instance, asking learners to write down about how they want to be remembered by future generations (see Box 1) increases their intentions to behave in a sustainable way[26]. Imagining one's own life when being an elderly (e.g., by drawing and describing oneself at that age), or even in just four years from now, has been found to increase sustainable fishing behaviour[27] and to increase the likelihood of getting involved in an environmentalist organization[28]. Finally, engaging learners in a collective improvisation-based creation of a theatre play regarding sustainable futures has been found to increase futures literacy[29].

Here again, evidence from the behavioural sciences confirms the fitness of this competence to promote sustainable behaviour, confirming the need to embed it in curricula. One of the main documented barriers to sustainable behaviour is, precisely, our difficulty to **think about the future**. Unlike Covid-19, sustainability issues like climate change can seem distant (see Figure 5 and the quote in the blue bubble). In high income countries across the world, 28% of respondents do not believe that climate change is an 'emergency'[22]. Behavioural evidence shows that the more people perceive climate change as something occurring far in the future, the less they are likely to be concerned about it, to support mitigation public policies, or to reduce their energy consumption[23] (see also the quote below). The problem here is that people have a natural tendency to focus more on immediate problems, gains, losses and risks, than on future ones[24]. This tendency is called the **present bias** or temporal discounting.

Similarly, the more people perceive climate change as **uncertain**, the less likely they are to engage in sustainable behaviour[23]. As a counterexample, farmers who have already personally experienced the effects of climate change are more likely to adapt their agricultural practices[25]. Therefore, recent extreme weather events might decrease people's perception of uncertainty of climate change.

Box 1. Example of an intervention to promote sustainability future thinking: essay writing[26]

ASSIGNMENT

For this writing task, we would like you to think about **what you want future generations to remember you for** when you're gone. In answering this question, you might think about ways in which you will have a positive impact on other people, skills or knowledge you will teach others, or aspects of your personality that you would like to be remembered for.

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5.ACTION: political agency, collective action, individual initiative

The fourth and final competence area in *GreenComp* is 'acting for sustainability'. This area covers political agency (e.g., demanding effective policies for sustainability), collective action (i.e., acting for sustainability in collaboration with others) and individual initiative (i.e., identifying one's potential for, and actively contributing to sustainability).

Education policymakers aiming to promote sustainable behaviour ought to include these 'acting' competences in their curricula, as they leverage or address numerous proven psychological drivers and barriers of (un)sustainable behaviour:

- **Ascription of responsibility** (third box on the left in Figure 1): the more people feel that they have a moral role to play to improve sustainability, the more likely they are to move to action[30,31]. This responsibility feeling has proven necessary for a wide array of actions, such as for politicians to vote sustainability laws, and for citizens to demand accountability for unsustainable policies or to engage in collective sustainability activism[32]. Conversely, blaming others (for instance, other countries for their larger emissions contributing to climate change) is associated with less feelings of responsibility for action, and hence with less likelihood of behaving sustainably[33]. The 'acting for sustainability' competence from *GreenComp* includes attitudes, knowledge and skills that precisely aim to increase learners' sense of responsibility regarding sustainability, for instance, the knowledge that 'individuals have a commitment towards society and the environment' and the ability to 'take personal initiative [...] in achieving sustainability'.

  Board games, such as the German '*Keep Cool*' game, have been proposed as an effective education tool to increase learners' sense of responsibility with regard to sustainability[34].

- **Efficacy beliefs** (fourth box on the left in Figure 1): a major driver for sustainable behaviour is individuals' belief that they are able to behave sustainably and that their action can make a difference[4]. For instance, lay persons may feel they have little to contribute to make their country sign the Paris agreements[33] (see also the quote below). In contrast, adolescents who feel their actions do matters are more likely to engage in pro-environmental behaviour, such as reducing their water consumption or signing a petition to demand environmental protection[35]. *GreenComp* explicitly outlines several competences that aim to increase learners' efficacy beliefs, for instance, the knowledge of one's 'own potential to bring about positive environmental change' and the knowledge that 'every action has an impact, even if not immediate'. Scholars have tested several education interventions to increase learners' efficacy beliefs with regard to sustainability. These include going to climate change exhibitions and preparing presentations about environmental problems[36]. Exposing learners to other people behaving sustainably (i.e., **vicarious experience**) can also help them believe that they are able to do so as well[37,38].

> *"I have a sense of helplessness sometimes when I hear the facts and think what can do [for climate change]? And all I can do is very small."*
> (quote from a qualitative interview[33])

- **Social norms** (fifth box on the left in Figure 1): the way other people *behave* has a major influence on our own behaviour, also when it comes to sustainability. For example, hotel clients tend to reuse their towel if they see that other clients also do so[39]. Others' *expectations* also affect our behaviour: for instance, the more managers feel society expects them to behave in a sustainable manner, the more likely they are to engage in environmentally responsible actions in their organisation[40]. Therefore, *GreenComp*'s competences related to collective action, such as the ability to mobilise others to adopt more sustainble choices, are crucial to diffuse sustainable choices among everyone.

Figure 6 – Social norm message to encourage learners to switch the lights off

Source: Leoniak & Cwalina[41], 2019.
Translation: "After leaving the toilet, turn off the light The vast majority of people turn off the light when leaving a restroom

Behavioural sciences have proposed several ways to leverage social norms among learners. One of this is to inform learners **that the adoption of sustainable behaviour** (e.g., recycling) **is widespread**. For instance, informing university students that most people switch off the lights is effective in motivating to do so as well[41] (see Figure 6). Interventions using social norms can also backfire if the most common behaviour is unstainable. For instance, if people see that others litter a lot, they are more likely to do so as well (see Figure 7)[42]. Therefore, special care must be taken when using social norms interventions to promote sustainable behaviour.

Figure 7 – Social norms of unsustainable behaviour

Source: Rangoni & Jager, 2017[43]

Another intervention consists in using **social comparison**, i.e., providing learners with a tool to compare their sustainability performance with that of their classmates or other schools. Figure 8 shows an example of an education intervention in which Spanish primary schools compete with one another to sort as much glass waste as possible. One needs to be cautious with this type of intervention, however, as it runs the risk of decreasing instrinsic motivations to behave sustainably (i.e., ''I sort glass because I care') 'in favour of extrinsic motivations (i.e., 'I sort glass because I want to win a prize')[44].

Figure 8 – Inter-school contest for sorting glass, leveraging social norms

Source: Ecovidrio[45] *(reproduced with Ecovidrio's permission)..*
Translation : "The little sorters. Challenge for our district's primary schools. Let's sort a lot of glass containers! Help your favourite primary school win a lot of prizes, and your town to be more sustainable.".

- **Habit** consists in a predisposition to repeat past behaviour, often without a conscious intent[46]. Even if people are concerned about sustainability, know which actions to take and think these actions may have a positive effect, they may experience difficulties in changing their habitual behaviour accordingly. For instance, habit is a major barrier (although not the only one) to commuting by bicycle (vs. by car)[47], to taking shorter showers[48] or to adopting more sustainable diets[49]. Farmers who generally resist change are less likely to adopt sustainable agricultural practices such as conservation tillage[50]. *GreenComp* aims to equip learners with competences to address these barriers, for instance with the skill 'overcoming one's own resistance to change' and the knowledge that 'maintaining the status quo and inaction are also a choice'. An experiment with teenagers (14-19 years old) shows how a collective **public commitment**, together with weekly workshops to **set common goals**, can help break the habit of plastic overconsumption[51].

6. CONCLUSION AND DISCUSSION

This reports confirms that *GreenComp*'s sustainability competences can help learners behave in a more sustainable way, as these competences leverage the main documented psychological drivers of sustainable behaviour (see Figure 1). Learners are more likely to behave in a sustainable manner when they value sustainability as a guiding principle in their life (*personal values*), when they understand and worry about the consequences of unsustainability (*awareness of* consequences), when they feel responsible (*ascription of responsibility*) and empowered (*efficacy beliefs*) to improve the situation at their level, not alone, but as part of a bigger movement (*social norms*). **The competences identified in *GreenComp* leverage each of these psychological drivers of sustainable behaviour**. This policy brief has shows how the sustainability competences in *GreenComp* can address its **psychological barriers**, such as the difficulty to think about the future and habit.

Throughout the report, we have also put forward several **educational interventions** that can help addressing the psychological barriers and leverage the drivers for more sustainable behaviour. These include gamification, walks in natural areas, essay writing, and contests.

Given the **confirmed potential of GreenComp's competences to contribute to more sustainable behaviour**, the findings reported in this report support the **policy recommendation to equip learners with the competences identified in *GreenComp***. With these competences, learners are more likely to play an active role in delivering the **EU Green Deal** and in achieving the UN Sustainable Development Goals.

Importantly, sustainability competences are relevant **not only for (future) citizens and consumers**. Learners acquiring sustainability competences may also behave in a more sustainable way if they later act, for instance, as voters choosing MPs supporting sustainability, as **lawmakers** passing sustainability regulations[52] or providing budget for new public transport infrastructures, as engineers designing more sustainable turbines, or as **CEOs** granting fair wages to workers. Therefore, those who tomorrow may have a greater responsibility to contribute to sustainability may also benefit today from acquiring the sustainability competences identified in *GreenComp*.

Three words of caution.

First, **structural constraints** beyond people's control can play a major role in explaining why they do not act more sustainably[2]. For instance, the price of train alternatives may be much higher than taking a flight for certain routes, recycling facilities may be very far from home, public transport may not be available, and undemocratic settings may make fairness spolitical action difficult. In that sense, sustainability competences *can* help learners behave in a more sustainable way, *but* infrastructures, laws, and technology also need to enable them.

Second, there is **no deterministic relationship** between sustainability competences, psychological drivers/barriers and sustainable behaviour. Sustainability competences may not directly address the psychological drivers and barriers. Psychological drivers to sustainability, in turn, increase the *likelihood* of sustainable behaviour, but they are not a silver bullet leading unconditionally to sustainable behaviour. The same goes for psychological barriers – addressing them does not mean that sustainable behaviour will automatically occur.

Third, there is no single psychological driver or barrier that, if addressed, will on its own make learners behave more sustainably. For instance, sustainability values are necessary, but not sufficient, to promote sustainable behaviour. **We thus need a holistic approach** that tackles all the psychological drivers and barriers, as we do for *GreenComp*'s sustainability competences.

7. ACKNOWLEDGEMENTS

The author would like to thank Marcelino Cabrera, Hendrik Bruns, Mario Scharfbillig, Margherita Bacigalupo, and two anonymous reviewers for their very valuable comments and suggestions on earlier versions of this document. Thanks also to Abdel Bitat for pointing to valuable data to illustrate this policy brief.

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