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Learning to know, do, be and live together for climate change education. A reflection on practices that work in the context of geographical education

Chew-Hung Chang[a]

[a] National Institute of Education, Nanyang Technological University, Singapore
Email: chewhung.chang@nie.edu.sg

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Abstract

Research literature on climate change education has been primarily focused on reporting how programmes are designed to help students learn the topic of climate change better. The aim of such education programmes invariably endeavours to educate a globally informed citizenry in response to the contemporary climate crisis through effective teaching and learning. While there have been literature to show how students' knowledge, skills, attitudes and behaviour have changed for the better with effective teaching and learning, this article seeks to curate some of these practices, especially those published by the author to exemplify how we can achieve the UN Delors report's (1998) suggestion that education needs to help students to learn to know, learn to do, learn to be and learn to live together. These desired outcomes are also aligned with the aspirations of geographical education as set out in the International Charter on Geographic Education (CGE, 2016). The article will draw on published works by the author, review the relevance of these studies and compare them with other published works to provide an argument for using the Delors Report to help teachers in their curriculum planning and lesson designs. While education is inherently future-oriented, there needs to be some coherent and contiguous treatment of the way education practices can be used. To this end, the article's approach to curating the published work will provide a critical discussion using a known framework to advance the discourse on best practices for climate change education. Ultimately the aim of climate change education should be to provide students with the capabilities and opportunities to flourish in society now and in the future, particularly in the face of the challenges brought about by global climate change.

Keywords: Climate Change Education, Geographical Education, Capabilities, Curriculum Making

1. Introduction

Climate change was previously a contentious issue that was often misrepresented in the media, but it has become widely accepted by scientists and the public (Chang, 2023). Initially, the contention was around whether climate change was real. Sceptics and contrarians initially

denied it exists, then admitted it existed but questioned if human influence was the cause. Subsequently some people downplayed the severity of its consequences even after anthropogenic causes were acknowledged by the scientific community. The most recent, and perhaps most troubling trend is that while acknowledging that there is human-caused climate change, some are claiming that the consequences are manageable or even beneficial to humans and society, citing examples such as potential increases in food production in some regions (Busch and Judick, 2021). Although climate change has political, economic, and social impacts, general awareness of these impacts has not led to the necessary collective action to effectively respond to the crisis. The author argues that one of the key strategies used to achieve longer term collective action is through climate change education.

Educating about climate change is crucial to its sustained mitigation and adaptation. UNESCO and UNEP have emphasised education's role in climate change mitigation and adaptation (UNESCO and UNEP, 2011), recognising that policies and curricula should be aligned to establish knowledge foundations, promoting understanding of causes and impacts, skills, values, and attitudes through "appropriate action-oriented pedagogies" (UNESCO and UNEP, 2011, p. 55). The trend is to integrate climate change topics into school subjects.

Climate change education (CCE) as a mitigation strategy can only be as effective as the curriculum. In turn, the curriculum can only be designed and implemented successfully if we have a good idea of the students' knowledge and attitude towards the issue. Research suggests that teaching students based on their readiness levels leads to increased engagement and success (Vygotsky, 1986). Climate change education should be relevant, engaging, and employ relevant pedagogies. Zadrozny et al. (2023) advocates for a "Powerful Geography" approach by considering students' interests and future careers, making learning applicable to real-world scenarios. He et al. (2024) recommends the GeoCapabilities approach, to develop students' abilities to think geographically, promoting critical analysis and problem-solving skills regarding issues of climate change. In addition, Hilander et al. (2023) emphasizes the importance of early childhood intervention, advocating for play-based and hands-on activities to foster environmental awareness among young children. These pedagogies aim to make climate education meaningful and impactful across all educational levels. However, CCE can be implemented more effectively by identifying what they know and what they don't. While there are several studies on student knowledge about climate change, the author highlights one such study on students' misconceptions about climate change in the context of Singapore.

According to Chang and Pascua (2016), students usually think that storms, hurricanes, and droughts are related to climate change without really knowing the causes or the impacts. Confusion over the contributions of greenhouse gases like chlorofluorocarbons, misunderstanding the enhanced greenhouse effect, which refers to the trapping of terrestrial long-wave radiation rather than the trapping of solar radiation, and thinking that tsunamis and earthquakes are due to climate change, are some of the misconceptions highlighted in the study. Table 1 shows the list of misconceptions reported in Chang and Pascua (2016).

Type of Misconception	Frequency (%)
Natural causes of climate change	81.5
Natural vs. enhanced greenhouse effect	88.9
Fossil fuel use as anthropogenic cause	88.9
Farming as anthropogenic cause	100.0
Deforestation and carbon oxidation	100.0
Water vapour as a greenhouse gas	96.3
The positive feedback loop	96.3

Table 1. List of misconceptions found in Chang and Pacsua (2016). Source: Chang and Pascua, 2016, p. 87.

While it may seem obvious that one of the ways to improve climate change learning is to address these knowledge gaps as suggested by Chang and Pascua (2016), education is not just about amassing knowledge. The purpose of education is "to give the young the things they need in order to develop in an orderly, sequential way into members of society" (Dewey, 1934). Indeed, the mission of educators is to "prepare

students to succeed in a diverse and interdependent world" (Reimers, 2017). To this end, education mustn't just be about feeding students with knowledge, but it should allow us to equip students with the necessary capabilities to succeed in society and in life.

2. Framework

In 1998, the United Nations Educational, Scientific, and Cultural Organization, published a report titled "Learning – the treasure within". It was authored by Jacques Delors, and the report identified four pillars as fundamental principles for establishing education for the twenty-first century. Delors (1998, p. 97) advocates for an integrated approach to formal education based on four pillars of learning (commonly referred to as the 1998 Delors Report) which include:

1. learning to know – a wide general understanding as well as depth in a few subjects;
2. learning to do – to develop not just vocational competencies but also the skills and ability to deal with a variety of situations;
3. learning to be – to develop one's personality and to be able to act with increasing autonomy, judgement and personal responsibility;
4. learning to live together – through cultivating empathy for others and a respect for interdependence.

While the 1998 Delors report has been published for quite some time, the author argues that it still provides a useful framework against which we can examine how we should equip students with learning beyond knowledge acquisition, especially with respect to climate change education.

Indeed, this aspiration is not different from the purpose of geographical education as outlined in the International Charter on Geographical Education (CGE, 2016). Chang and Aman (2017) wrote about the key aims of the International Charter on Geographical Education in relation to what is being assessed in geographical education. The Charter (as it is commonly referred to in the field of geographical education), states that "geographically educated individuals understand human relationships and their responsibilities to both the natural environment and to others… geographical education helps people learn how to exist harmoniously with all living species" (CGE, 2016 p. 6). These two statements encapsulate the aspirations for students to learn to know, do, be and live together. It is for this reason that the discussion in this article is also focused on examples from geographical education. Let us consider further how each of these dimensions of the Delors report support learning about climate change in the context of geographical education.

Building on people's own experiences, learning geography helps them to formulate questions, develop their intellectual skills and respond to issues affecting their lives. This is what learning to know is about. CCE can provide students with a comprehensive understanding of climate science, its impacts, and mitigation strategies. An effective approach to address climate change knowledge is to incorporate climate change topics into different academic subjects. For instance, science can cover concepts like the greenhouse effect and climate models, geography can focus on studying climate patterns and human impact, and social studies can explore policy responses and environmental justice (Chang, 2023).

To help students to learn to do, we can equip students with practical skills and competencies needed to address climate change in real-world situations. This can be done by involving students in practical activities such as establishing school gardens, performing energy audits, or joining local environmental initiatives. These activities will enhance problem-solving and critical thinking abilities and promote engagement in community service for environmental sustainability (Chang, 2023).

Learning to be means developing individual growth and the capacity to make well-informed and accountable choices regarding climate change. This will foster self-awareness and cultivate personal accountability by engaging in reflective activities such as journaling or

participating in group discussions centred around ethical quandaries pertaining to climate change. Essentially, it is about developing a students' dispositional learning about climate change.

Learning to live together requires our students to develop empathy, collaboration, and reverence for the interdependence of all living beings. We can do this by creating inclusive learning environments that encourage student collaboration in climate-related projects, with a focus on the significance of diverse viewpoints and effective teamwork. This will promote cultural exchange and allow students to understand the interdependence needed to combat climate change.

Using the Delors report as a framework will provide us with a scheme against which we can evaluate if the various examples selected in this article will indeed help our students learn about climate change better.

3. Method

In order to use selected examples to demonstrate how climate change education practices work, a loose adaptation of the integrative research synthesis methodology is used. In pure integrative research synthesis, it combines aspects of reflective practice and research review (Schick-Makaroff et al., 2016). These involves various approaches to "combining, integrating, and synthesizing research findings" (Schick-Makaroff et al., 2016, p. 172). The adapted method taps on personal experiences as well as published literature to construct a process that curate and discuss research to determine the best practices to enhance teaching and learning. The article will refer to some of the author's published works, evaluate their significance in relation to the best ways to help students learn to know, do, be and live together. The selection of the works is guided by the author's experience in the discourses within the field of climate change education, and purposefully chosen to discuss aspects of using the Delors report. To scope the discussion further, the works referred to can draw on those from environmental education and sustainability education, with a focus on climate change. Further, the article will compare these with other published works to advocate for the adoption of the Delors Report to help teachers consider the learning outcomes in their curriculum planning and lesson designs. In a way, this method also draws on the works in similar areas of critical narrative that the author has previously used to discourse on the state of climate change (Chang, 2015). The following sections will present the findings in discussion format around the 4 pillars of the Delors report (1998).

4. Learning to know

We do not know what we do not know. The idea that we cannot possibly know everything is a fundamental limitation of human knowledge. This is particularly true of learning about climate change, which is a very complex and dynamic issue that requires continuous learning. To begin with, the climate system can be affected by many things such as solar radiation output, greenhouse gas emissions, planetary albedo, among many natural and human-induced factors. To add to this complexity is the role of interaction and feedback among these factors which lead to a constantly evolving understanding of how the climate system works. One could argue that the ubiquitous internet search capability has advanced to a stage where one can easily find out the information needed to explain any phenomenon one desires. However, the issue remains as to how do we know what to search for, if we do not know what we do not know?

The concept of powerful knowledge as advocated by British education sociologist Michael Young (Young et al., 2014) refers to knowledge that enables us to understand and engage with the world in a profound way. In other words, powerful knowledge can help us identify gaps in our understanding. In as far as climate change is concerned, powerful knowledge allows us to understand the interconnectedness of various scientific, economic, and social factors influencing climate change.

This helps us determine where our understanding is incomplete or inaccurate. For addressing these gaps in knowledge, the author refers to the work published on climate change misconceptions (Chang and Pascua, 2016). The author posits that addressing misconceptions early on will help the learner develop a solid foundation for further learning. Studies have shown that misconceptions, if not corrected, can persist, and even impact the understanding of new concepts negatively (Vosniadou and Brewer, 1992; Chang and Pascua, 2016).

Misconceptions about climate change can arise as a result of incorrect, incoherent, or incomplete mental models among students. Using the anthropogenic greenhouse effect as an example, a correct, complete and coherent understanding would look something like Figure 1 as reported in Chang and Pascua (2016).

Further, Chang and Pascua (2016) devised a technique to diagnose students' misconceptions of climate change in Singapore. Called the Climate Change learning Diagnostic Test (CCDT), the study used a diagnostic exam modelled after Treagust's (1988) two-tier methodology. The tiered test consists of two sections: the Content Tier, which evaluates the knowledge of the subject matter, and the Reasoning Tier, which analyses the underlying concepts that support the content knowledge. The items are specifically designed to identify misconceptions in climate change education through the use of multiple-choice questions (MCQs). This two-tier approach provides insights into students' cognitive processes that cannot be acquired through other conventional methods. For instance, it allows researchers to analyse how students engage in reasoning by utilising both domain-specific and domain-general information (Tsui and Treagust, 2010).

The following are three examples of items in the CCDT (Chang, Pascua and Ess, 2018, p. 16).

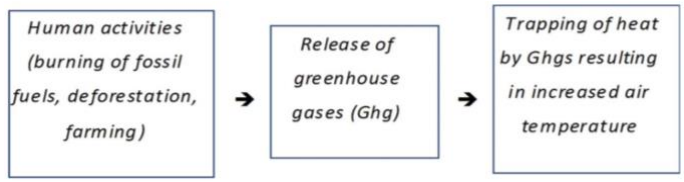

Figure 1. An explanation of anthropogenic greenhouse warming.
Source: Chang and Pascua, 2016, p. 88.

1. Water vapor is a greenhouse gas.
   a. True
   b. False

The reason for my answer is:
   a. Water vapor traps hear
   b. Water vapor damages the ozone later
   c. Water vapor cools the atmosphere
   d. Others: _____

2. If we say that greenhouse gases shield the earth, these gases are protecting us from _____.

   a. Ultraviolet (UV) rays from the sun
   b. The extreme cold of outer space.

The reason for my answer is:
   a. Greenhouse gases prevent too much sunlight from reaching the Earth's surface
   b. Greenhouse gases prevent some heat that the earth has absorbed to escape
   c. Greenhouse gases help slow down the thinning of the ozone layer
   d. Others: _____

3. _____contributes. To the enhancement of the greenhouse effect.
   a. Wind energy
   b. Natural gas
   c. Nuclear power
   d. Geothermal energy

The reason for my answer is:
   a. Produces radioactive waste
   b. A fossil fuel
   c. Causes pollution
   d. Others: _____

In the first example, water vapor is a greenhouse gas because water vapor traps heat. Students' responses for the first part of the question will show whether the students are correct propositionally. The reasoning tier of the question next indicates whether the student has incomplete or incoherent understanding, if they were unable to respond for this tier or if they chose a wrong answer, respectively. The second item tests if the students understand the concept of terrestrial radiation being trapped by greenhouse gasses. The first tier would test if they know that greenhouse gases protect us from the extreme cold from space and the second tier would ascertain if they know this is because of the greenhouse effect. The third items test students to see if they can identify which gases contribute to the greenhouse effect and the second tier would ascertain if they are able to explain that it is a greenhouse gas. This instrument has been tested for reliability with a .893 Cronbach alpha value, which means that the instrument has high internal consistency. In social sciences, a score of .70 is used as a benchmark (Pascua and Chang, 2015). In their study, the items were linked to a list of misconceptions and the relative percentages of the students with disposition, incomplete or incoherent misconceptions can be determined. This is useful for two purposes. Teachers can identify which misconceptions to focus on and researchers can use this instrument as a pore- and post-test to determine if their intervention works.

By using this tool, Chang and Pascua (2016) found that students had many misconceptions, with many only being able to correctly answer the Content Tier, resulting in many instances of mixing incorrect and correct notions. Misconceptions reported in the literature centred on a lack of understanding of climate change as both a natural and man-made phenomenon, the natural greenhouse effect and its properties, the enhancement of the greenhouse effect, the elements involved in heat-trapping, and their characteristics (Chang and Pascua, 2016). Also, there were significant misconceptions among students about the effects of climate change, particularly how they relate to other non-atmospheric events like tsunamis, earthquakes, acid rain, and skin cancer. This study supports Von Aufschnaiter and Rogge's (2010) hypothesis that poor comprehension is primarily caused by missing concepts and a lack of explanatory conceptual understanding available to students.

In some ways, Chang and Pascua's (2016) findings reinforce the need for correspondingly effective pedagogical practices that can immediately correct these misconceptions. In the same year, Chang, Pascua and Ess (2018), published a refutation pedagogy paper to show how these misconceptions can be corrected. Indeed, a deliberate shift towards more explicit recognition, assimilation, and direct rebuttal of incorrect knowledge systems will be beneficial, and the CCDT is essential for assisting teachers in identifying students' misconceptions. In this case, the CCDT is used as a pedagogical and assessment tool to help teachers diagnose the misconceptions better so that pedagogies can be developed to support the students' learning to know.

5. Learning to do

Apart from knowledge, good climate change education should develop cognitive skills such as critical thinking for students to analyze and evaluate the information that they come into contact with. Monroe et al. (2019) found that students engaged in climate change education programmes that use problem-solving activities had improved critical thinking skills, especially in analyzing and evaluating complex environmental issues. The study by Chang, Pascua and Ess (2018) also showed how students were able to correct misconceptions after using refutation texts to examine erroneous information.

However, even as critical thinking is essential for good climate change education, discussions about climate change impact and management often lack empathy for authentic criticism thinking. Öhman and Östman (2019), showed that critical discussions in environmental education frequently emphasize rational and logical reasoning, which can diminish the importance of empathy in considering the perspectives of multiple stakeholders in discussions about climate change adaptation and

mitigation. One important aspect of considering empathy is realizing that there are potentially trade-offs for different stakeholders depending on the type of climate change mitigation or adaptation strategy being used. Indeed, Martusewicz, Edmundson, and Lupinacci (2015) also argue that understanding social, economic, and environmental trade-offs is crucial for climate action. Without this appreciation of the trade-offs, discussions may become detached from real-world human experiences and the implications brought about by climate policies.

While there is little research to report on effective pedagogies to teach trade-offs, some effort has been underway in the author's department where there is a Sustainability Learning Laboratory (SLL). The SLL was set up at the National Institute of Education, Nanyang Technological University, Singapore with the aim of enhancing the teaching and learning of sustainability, both within the Institute's education programmes as well as for Singapore schools. One of the initiatives at the SLL is the development and use of a card game titled "Getting to Zero" (GTZ). The game utilizes various climate change adaptation and mitigation policies as descriptions on different cards bearing carbon emission and economic growth values. In a simple facsimile of values in carbon cuts and monetary value, the goal of the game was for the winning player to attain the greatest carbon cuts. In a scenario if there is a tie among players with the highest carbon cuts, the player with the highest remaining monetary value is the winner. This is what governments would want to see in the real world where carbon emission reduction does not compromise economic growth. But the game is not so straightforward lest it becomes too boring for the players. Each card that bears value is designed to show that there are real trade-offs in the real world. For instance, the card that shows the use of solar panels to generate alternative energy has a good carbon cut value, but it will also cost the economy more money.

In this regard students playing the game get to understand the trade-offs. While the game has been used in many schools in Singapore empirical research to determine its efficacy is still under-way. The use of this card game is highlighted here as just one example for discussion in the learning to do aspect of the argument in this article. The playing instructions and resources for the GTZ card game can be found at SLL URL is at https://www.ntu.edu.sg/nie/research-labs/sustainability-learning-lab.

However, taking climate action will be the ultimate goal of learning to do. The author highlights a study by Wi and Chang (2019) where participants of the study goes through what the authors describe as a Transformative Education for Climate change (TrEC) programme that requires the learners to focus on task-oriented problem solving and provided a platform for learners to seek clarification from an expert. The design of the programme was based on Mezirow's (1997) transformative learning theory and it was part of a public education collaboration between the authors and the local government to enhance the learners' knowledge, skills, and values in managing their energy consumption. The programme includes three main phases: an introductory video providing basic background knowledge about climate change and its impact, a discussion in a casual setting where participants learn conservation tips to reduce their energy consumption, and a question-and-answer (Q&A) session for participants to clarify any doubts. Participants can continue to seek guidance from the authors even after the Q&A sessions.

Wi and Chang (2019) measured the participants' household energy consumption before and after the programme as a proxy indicator of whether the subjects had changed their household energy consumption patterns. The study reported that the paired sample t-test for unequal variance showed that the participants in the experimental group had an average decrease of SGD5.60 in their utility bills (SD = 12.1539), while those in the control group had an average increase of SGD1.80 (SD = 17.0469). This difference was statistically significant, $t(171) = 3.2665$, $P < 0.01$, indicating that there is indeed a change in consumption behaviour, a positive step towards climate action.

There was also an accompanying survey that asked participants about their attitudes and beliefs about taking environmental action and this leads into the discussion on learning to be and learning to live-together.

6. Learning to be and to live together

Learning to be and to live together with other individuals transcends our usual aspirations for knowledge, skills and action. This requires change in mindset, a dispositional transformation as it isn't just about having attitudes or values about the individual and their relationship to the environment but also a consideration of the individual's interaction with the environment in relation to the community, the global community. It is for this reason that the discussion in this section will include both learning to be and learning to live together.

If the goal of climate change education is centered on the notion of "being", where an individual is climate conscious, then the person needs to have the knowledge about what to do and take concrete actions for what they believe in. A number of studies have shown that peoples' environmental action are related to their environmental knowledge and understanding (Chawla and Cushing, 2007; Kenis and Mathijs, 2012; Poortinga et al., 2003). However, Wi and Chang (2019) argue that environmental action or behaviour can become habitual if performed regularly and rather than relying on attitude and reasoning each time an action is done, the behaviour can be determined by automated cognitive processes (Chang and Wi, 2018). In other words, climate action can be guided by some cognitive structure(s) that can be learned, stored, and retrieved from memory when a person encounters a particular situation (Steg and Vlek, 2009).

Of course, an individual's action is also driven by one's values. Wi and Chang (2019) also examined the values as suggested in the Value-Belief-Norm theory of environmentalism (Steg et al., 2014) in the context of climate change education, in addition to finding out if the intervention programme could result in people taking action. They analyzed the hedonic value that is concerned with one's feeling and effort, egotistic value that is concerned with increasing one's benefits, the altruistic value of concern for others' welfare, and the biospheric value where an individual has concern for the environment. They found that for those who have gone through their programmes that there was a 14.1% increase in the participants who believed that it was easy and not inconvenient to perform pro-environmental behaviour. Do recall that this same study found that the participants did show savings in utility bills, which is used as a proxy indicator of them taking on pro-environmental climate action. What is interesting is the context that this was not just about learning to be, the participants realised that it is all being part of living with others in the global community. Indeed, the study found that there was a 21.8% increase in the participants who believed that the actions of a single household can make a difference in climate change. This indicates that the TrEC reported by Wi and Chang (2019) not only helped people learn to do, but it also helped them learn to be and to live together. Of course, one can argue if this is due to costs (Diekmann and Preisendörfer, 2003) or values (Steg et al., 2014) and it is difficult to determine if the change in value is of a nature that is hedonic, egoistic, altruistic and biospheric or a combination of all four. Wi and Chang (2019) did state that the qualitative comments captured during the survey showed evidence of hedonic and egoistic values when they were encouraged to adopt pro-environmental behaviour.

Further, their study also found that some participants thought that taking action alone is insufficient as all individuals live in the community and there is collective responsibility and action involved in learning to live together. In other words, an individual should consider taking climate action not just for the causal and moral obligation as a person but also as a member of a community.

Based on the Wi and Chang (2019) study, there is evidence that there needs to be a programme or intervention that is designed to educate individuals about the issues, values and action for climate change. Moreover, the willingness to take climate action while normally related to their knowledge and understanding (Chawla and Cushing, 2007; Kenis and Mathijs, 2012; Poortinga et al., 2003), should also consider how values, responsibility to the community and pressure from peers factor into encouraging climate action.

7. Conclusions

The discussion on how we can encourage climate change education through well-designed programmes points to the need to effectively teach the complexities of climate change beyond knowing, doing and being, to understanding that we are all living together in a global community. There is a convergence in the programmes and practices in their aspirations to educate a globally informed citizenry that is capable of responding to the climate crisis. The goal of climate change education seeks to increase students' knowledge, help them foster skills, attitudes, and behaviours that support climate action. By highlighting some practices and examples, with a special curation of those published by the author, this article demonstrates how the four pillars of learning suggested by the UN Delors Report (1998) can be used to guide the development of programmes. In addition, we can also draw similar ideas from the Organization for Economic Co-operation and Development (OECD) Learning Compass 2030.

The OECD Learning Compass 2030 describes learning framework that articulates a broad vision of the types of competencies students need to thrive in 2030 (Figure 2). In their conception, we can see that whether it is knowledge, attitudes, skills or values, they target the learning to know, do, be and live together aspects.

The author reflected on a seminar that was delivered at the Department of Letters and Modern Cultures (Geography unit), Faculty of Letters and Philosophy, at the Sapienza University of Rome in the spring of 2024 on the future challenges and opportunities for geographical education[1]. The author was visiting the department and was invited to provide some perspectives in his capacity as the co-chair of the CGE as well as the President of the Southeast Asian Geography Association on the future challenges of geographical education. The discussion on climate change education was particularly focused on how we can encourage people to take climate action. The audience comprised undergraduate and graduate students as well as several colleagues. One member of audience (who is an educator) posed the question of how to change the habits and behaviour of older people who do not seem to care about climate change impact. The discussion that ensued placed the responsibility on us as educators and on our students as custodians of our common sustainable future. There was an agreement that it is through helping students learn to be and learn to live together that we can begin to encourage more collective effort in climate action. Someone in the audience also agreed that we need to take this very important first step to educate our students first.

Through reviewing and comparing a selection of studies, the article argues for the use of the four pillars of learning in the Delors Report framework in how we can design our teaching and learning activities. Effective climate change education should equip students with the capabilities and opportunities to succeed and flourish in society, now and in the future, particularly in the face of global climate change challenges. This integrative and holistic approach ensures that students not only acquire knowledge, but also develop the critical thinking skills, personal responsibility, and collaborative abilities needed to address climate change. Indeed, emphasizing the need for students to learn to know, do, be, and live together are also what geographical educators are interested in. The Delors aspirations are also outlined in the International Charter on Geographic Education (CGE, 2016). Ultimately, the aim of education is to empower students to take meaningful action towards a sustainable future, fostering a sense of global citizenship and community responsibility in a climate change world.

[1] https://web.uniroma1.it/lettere/news/prof-chew-hung-chang-challenges-and-opportunities-geography-education-beyond-21st-century.

Figure 2. OECD Learning Compass 2030. Source: OECD, 2019, p. 6.

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