

CHAPTER 13: THE EFFECTIVENESS OF THE EDUCHANGE PROJECT IN DEVELOPING KNOWLEDGE, VALUES AND ATTITUDES ABOUT CLIMATE CHANGE.

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Abstract

The EduChange project was led by a consortium of four universities and its main focus was to develop teaching and learning experiences about Climate Change through water related issues, utilising innovative place-based education and blended learning. Through EduChange, pre-service teachers were encouraged to develop creative learning environments in which students could work together to create knowledge and learning experiences.

Research on projects that aim to influence awareness and behaviour towards climate change have been published globally, but studies on the effectiveness of inter-university led projects that focus on pedagogy are rather limited. This study aims to shed light on the knowledge, values and attitudes of student teachers towards climate change, and the extent to which the EduChange project can be a vehicle for change. The student cohort selected for this study was composed of students from the Czech Republic, Malta, the Netherlands and Norway.

A mixed method approach was adopted entailing the collection of data using both qualitative and quantitative methods. The data was collected after fieldwork sessions carried out during the project. The study shows that EduChange had a positive effect on the knowledge and awareness of student teachers concerning climate change issues. Moreover, results show that the various activities had varying rates of success in different contexts. In response to these findings, a number of recommendations and a list of possible activities are drawn up to further enhance the effectiveness of the project and to infuse ESD principles into Climate Change Education.

Climate Change and Education for Sustainable Development

The goals, objectives and principles for an educational system that was action-oriented and prepared individuals and social groups to face environmental issues and their associated problems was tabled at the UNESCO-UNEP Intergovernmental Conference on Environmental Education in Tbilisi (1977). Work on achieving this aim officially commenced as a follow up to the UNESCO Conference on Human Environment held in Stockholm (1972). Environmental education had to be contextually relevant, interdisciplinary, inclusive, participatory, transformative and emancipatory.

Although hopes were high, the outcomes soon showed that this intended revolution was not successful to the degree originally anticipated. Quite naively, blame was attributed to issues related to semantics rather than to the inability of educational institutions to be flexible and adapt to emergent needs. Consequently, a myriad of forms of education flourished, with Education for Sustainable Development (ESD) becoming the most popular to date, probably because of the interest generated by the UN Decade of Education for Sustainable Development (2005-2014) (Pace, 2010).

The Decade served to highlight the importance of a proactive stance and a supportive infrastructure in its list of Priority Action Areas that ESD should address in the coming years (UNESCO, 2014):

- Mainstreaming ESD into both education and sustainable development policies;
- Integrating sustainability principles into education and training settings;
- Increasing the capacities of educators and trainers to deliver ESD more effectively;
- Empowering and mobilizing youth; and
- Accelerating sustainable solutions at community level.

If one had to gauge the success of ESD, one would have to look into whether we have succeeded in developing learners who are open to change, i.e. not just thinking, but functioning outside the proverbial box. This is particularly relevant to education about Climate Change.

Although experts over the years have studied, highlighted the complexities and foretold the impacts of Climate Change, we are still learning and discovering new aspects of its multifaceted nature. Like other issues concerning sustainability, Climate Change is a wicked problem as dealing with it requires a deep understanding of the complex interactions between environmental, social, cultural and economic systems. While ESD holds the promise of preparing students to anticipate, face and address wicked problems, higher education institutions – seen as central contributors to ESD – have been repeatedly criticized for not providing students with the required skills, attitudes and values to do so (e.g. Orr, 1994; Pace, 2010; Leal Filho et al. 2019). Perhaps the inability of higher education institutions to adapt to ESD is in itself a wicked problem, as there are complex issues involving monodisciplinary structures; traditional approaches to learning; lack of clear commitment to ESD; lack of resources; territoriality issues and competition between students, faculties, departments and universities (Moore, 2005).

Climate Change Education (CCE) falls within the domain of ESD. It may therefore be appropriate to present it through an ESD framework such as the Delors Report to UNESCO in 1996 (Mochizuki and Bryan, 2015). The Delors report conceptualises four pillars of education (Delors, 1996), two of which are especially significant in the CCE context:

Learning to know: Students need to understand the causes and consequences of Climate Change as well as Climate Change mitigation and adaptation tools.

Learning to do: Students need to develop cross-cutting skills such as coping with one's emotion such as fear, being able to adapt fast to different situations and learning contexts, understanding systems and envisioning different solutions and future scenarios.

Nonetheless, it is important to point out that CCE is seen to be complex and institutions who provide it within an ESD framework may consider it as having a number of challenges, including:

- while requiring immediate action, the consequences of Climate Change cannot be seen easily nor understood and measured;
- climate is a public good and affects every person in the world, but the vested self-interests of certain actors hinder the debate;
- action (decarbonisation) needs to happen on an unprecedented timescale;
- cognitive dissonance is common with individuals believing that climate mitigation needs to happen;
- in line with cognitive dissonance, many individuals feel that they do not need to act as it is someone else's job to do so; and
- integrating Climate Change mitigation is not seen as the social norm.

The above challenges can be more successfully addressed through being better embedded into existing teaching episodes, further highlighting the need to incorporate CCE within an ESD framework utilising different teaching and learning approaches.

The EduChange project

The project *EduChange – Making knowledge together* was a co-funded project supported by the Erasmus + Program involving a consortium of four universities: Norwegian University of Science and Technology – Norway; Palacký University – Czech Republic; University of Malta – Malta; and Utrecht University – the Netherlands. The project's overarching aim was to promote Climate Change Education – focusing particularly on water issues - through innovative place-based education and blended learning (<http://educhange.net/>).

EduChange was developed to address the inadequacy of traditional teaching and learning modalities by providing learners with practical first-hand experiences through which they could relate their acquired knowledge about climate change to real-life challenges. This was achieved by exposing university students to different methods and techniques that facilitated knowledge acquisition, development of skills and internalization of attitudes. Although the project allowed and encouraged personal reflection, most of the activities involved tasks carried out in collaborative groups of international peers to facilitate the sharing of different perspectives and the realities of different university students from a variety of educational backgrounds.

This current study was carried out mid-way through the project with the aim of reviewing and evaluating the project's methods and possibly improving its approach for the remaining year. The research questions thus focused on:

- Did students develop new and deeper perspectives about climate change?
- Did students develop new pedagogical and communication skills?
- Did experiences in place-based learning motivate students to learn?
- Did students develop a sense of commitment towards environmental action?
- Was the international dimension conducive to a deeper educational experience?

Methodology

Survey design

A questionnaire was undertaken to address the research questions on the effectiveness of EduChange and to fill the research gap of specific information on the programme. In a nutshell, the aim of the survey was to understand whether and how EduChange has an effect on student behaviour.

The survey aimed to portray the opinions and realities of students from different institutions regarding their opinions of EduChange, in addition to associated attitudes, practices and beliefs. The first list of items was reviewed by the authors to minimize redundancies and similar items, and to ensure that all important questions were included. The questionnaire was pre-tested (and subsequently revised) by a small panel of academics from the areas of education and sustainability. Survey Monkey was used for the final version of the online survey.

Sampling

The survey was disseminated via a web link through email to the participants of the 2019 EduChange fieldtrip that took place in Malta. There were 22 responses in all, which constitute all members of the cohort present at that time in Malta (Table 19).

Table 19: Distribution of sample based on country of origin

Country	No. of students	% of sample
Czech Republic	7	31.8
Malta	4	18.2
The Netherlands	5	22.7
Norway	6	27.3

The sample was predominantly female (Table 20) and within the 22-25 age bracket (Table 21).

Table 20: Distribution of sample based on gender

Gender	No. of students	% of sample
Female	16	72.7
Male	6	27.3

Table 21: Distribution of sample based on age

Age bracket	No. of students	% of sample
18 - 21	3	13.6
22 - 25	13	59.1
26 - 29	4	18.19
30 - 33	0	0.0
34 +	2	9.1

More than half of the sample was comprised of students studying a 2nd cycle degree at their respective university (Table 22).

Table 22: Distribution of sample based on their current degree level

Qualification	No. of students	% of sample
1 st cycle degree	6	27.3
2 nd cycle degree	15	68.2
Other	1	4.6

The main limitation of the study is that, although the sample represents all the students engaged in the second year of the project, the results cannot be generalised, and should be seen as trend indicators and insights for the design of similar future projects.

Results

Perspectives about the EduChange project

The students' responses summarised in Table 23 show that the primary target of the EduChange project, i.e. the promotion of innovative place-based learning, was achieved. The students overwhelmingly agreed that, due to their relevance, these teaching and learning techniques were much more effective than traditional lecture-based sessions. While acknowledging that adopting these techniques in class could be challenging, the majority of students agreed that it would be possible. In fact, all the students expressed their intention of using these techniques when they start their teaching careers.

The international dimension of the EduChange project had a very positive impact on the educational experience of the participating students. Although some of the students (36.4%) preferred working and learning within their national groups, all of them admitted that working as part of an international group widened their experience.

Table 23: Perspectives about EduChange

	Strongly agree	Agree	Don't know	Dis-agree	Strongly disagree	Weighted average
EduChange exposed me to teaching methods that I was not aware of.	22.7%	59.1%	4.6%	13.6%	0.0%	2.1
Place-based teaching methods make learning more relevant to students.	63.6%	36.4%	0.0%	0.0%	0.0%	1.4
When learning about climate change I would prefer listening to a good lecture rather than having a place-based session.	4.6%	0.0%	13.6%	59.1%	22.7%	4.0
The teaching methods proposed by EduChange are difficult to use in a normal lesson.	4.6%	9.1%	18.2%	63.6%	4.6%	3.6
The teaching methods proposed by EduChange are interesting, but not practical.	0.0%	9.1%	13.6%	54.6%	22.7%	3.9
I would like to use the teaching methods proposed by EduChange when (if) I start teaching.	63.6%	36.4%	0.0%	0.0%	0.0%	1.4
Visiting a foreign country helped me see aspects of climate change that I was not aware of.	31.8%	45.5%	18.2%	4.6%	0.0%	2.0
Working in international student groups helped me widen my experience.	63.6%	36.4%	0.0%	0.0%	0.0%	1.4
I prefer working and learning within national groups.	18.2%	27.3%	18.2%	31.8%	4.6%	2.8

Favourite EduChange activity

Students were asked to mark their most favourite EduChange activities. Table 24 summarises the results. It is quite evident that hands-on and experiential activities were the most popular. The Workshops introducing students to innovative educational methods topped the list (72.7%), with Lectures (with the exception of the lecture on Youth perspectives in the Netherlands) trailing behind.

Table 24: Favourite EduChange activity

Activity	No. of responses	% of responses (N=22)
Workshop on innovative educational methods	16	72.7
Field Visit: Chadwick Lakes	13	59.1
Group Activity: Designing Educational Sessions	12	54.6
Playing the Y-Floods Game	11	50.0
Playtesting of Educational Activities	11	50.0
Lecture: Youth perspectives in the Netherlands	10	45.5
Field Visit: Marsaxlokk fishing village	9	40.0
Visit to the Esplora Science Museum	7	31.8
Visit to the l-Ghajn Interactive Centre	7	31.8
Lecture: Malta and water – Irrigating a semi-arid landscape	4	18.2
Lecture: Youth perspectives in Malta	3	13.6
Lecture: Climate change and its impact on our life	1	4.6
Lecture: Water Education	1	4.6

Effectiveness of the EduChange project

The vast majority of the students (86.4%) rated the overall effectiveness of the project quite highly (Table 25).

Table 25: Effectiveness of EduChange

Rank	1 (lowest)	2	3	4	5 (highest)	Total	Weighted Average
No. of Responses	0	2	1	13	6	22	4.1
% Responses	0.0%	9.1%	4.6%	59.1%	27.3%		

Sustainable Development Goals

This question concerned the perceptions of students regarding the importance of the seventeen Sustainable Development Goals (SDGs). As shown in Table 8, students considered SDG13 - Climate Action to be the most important (59.1%) followed by SDG 11 - Sustainable Cities and Communities (50%) and SDG 12 - Responsible Consumption and Production (50%). This was to be expected as the main themes addressed during EduChange were in line with these SDGs and, to a lesser extent, with the next two SDGs listed in Table 26.

Table 26: Important Sustainable Development Goal

Sustainable Development Goal	No. of responses	% of responses (N=22)
SDG 13: Climate Action	13	59.1
SDG 11: Sustainable Cities and Communities	11	50.0
SDG 12: Responsible Consumption and Production	11	50.0
SDG 4: Quality Education	10	45.5
SDG 6: Clean Water and Sanitation	7	31.8
SDG 1: No Poverty	6	27.3

SDG 7: Affordable and Clean Energy	5	22.7
SDG 10: Reduced Inequality	3	13.6
SDG 16: Peace and Justice Strong Institutions	3	13.6
SDG 2: Zero Hunger	2	9.1
SDG 9: Industry, Innovation and Infrastructure	2	9.1
SDG 15: Life on Land	2	9.1
SDG 5: Gender Equality	1	4.6
SDG 8: Decent Work and Economic Growth	1	4.6
SDG 17: Partnerships to achieve the Goal	1	4.6
SDG 3: Good Health and Well-being	0	0.0
SDG 14: Life Under Water	0	0.0

Attitudes about Climate Change

Students participating in the EduChange project showed an overall positive attitude towards action to combat Climate Change (Table 27). They believe that Climate Change is a real phenomenon that needs attention and it affects them. While acknowledging the importance of both environmental and economic considerations, they were overwhelmingly in favour of prioritising environmental concerns over economic ones. They also felt that effective solutions regarding Climate Change require commitment on a local and a global level, and that one solution is the promotion of Climate Change Education directed towards the whole population.

Table 27: Attitudes about Climate Change

	Strongly agree	Agree	Don't know	Disagree	Strongly disagree	Weighted average
Persons engaged in climate change work are making a big deal of nothing	0.0%	4.6%	4.6%	22.7%	68.2%	4.6
Climate change is not affecting us in our country	0.0%	0.0%	0.0%	13.6%	86.7%	4.9
The highest priority should be given to protecting the environment, even if it hurts the economy.	27.3%	59.1%	13.6%	0.0%	0.0%	1.9
Both the environment and the economy are important, but the environment should come first.	57.1%	33.3%	4.8%	4.8%	0.0%	1.6
Both the environment and the economy are important, but the economy should come first.	0.0%	0.0%	4.6%	63.6%	31.8%	4.3
The highest priority should be given to economic considerations such as jobs, even if it harms the environment.	0.0%	4.6%	13.6%	45.6%	36.3%	4.1
We, common citizens, cannot do anything about climate change	0.0%	4.6%	0.0%	13.6%	81.8%	4.7

Countries should work together to deal with climate change issues	86.4%	13.6%	0.0%	0.0%	0.0%	1.1
People need more information on climate change	72.7%	22.7%	4.6%	0.0%	0.0%	1.3
Children should be taught about climate change in schools	95.5%	4.6%	0.0%	0.0%	0.0%	1.1

Personal actions taken on Climate Change

Table 28 summarises the students' personal actions that help reduce Climate Change. As expected, the majority of self-reported actions target energy consumption, waste management and transport, which are the three major causes of Climate Change. However, students are also quite engaged in other 'less familiar' actions, i.e. the reduction of meat consumption and the purchase of climate-friendly products.

Table 28: Personal actions taken on Climate Change

	No. of responses	% of responses (N=22)
Turn off lights when not in use	21	95.5
Reduce, Re-use or recycle waste when possible	21	95.5
Reduce meat consumption	19	86.4
Use energy saving light bulbs	17	77.3
Use public transportation to save fuel	17	77.3
Switch off standby devices	14	63.6
Buy from companies that sell or produce environmentally friendly/climate friendly goods and services	14	63.6
Use energy saving appliances	10	45.5
Car pool (share)/travel with friends to save fuel	10	45.5
Defrost refrigerator/freezer often	7	31.8
Use a solar water heater	3	13.6

The Authorities' role regarding Climate Change

In this open question students were asked to state what they thought the authorities should do with regard to Climate Change. Overwhelmingly, the students felt that the authorities should assume more responsibility and take concrete actions to address Climate Change. Most of the respondents (42.9%, N=28) felt that authorities should be more forceful when implementing Climate Change measures:

"I think that states may interfere more explicitly to influence people's environmental knowledge and behaviour."

"They should take action against it (Climate Change) even if it is not a popular decision."

"Authorities should implement realistic policies to ensure we work towards more sustainable practices sooner rather than later."

They also proposed that the authorities should "take specific actions", implement mitigation and adaptation measures such as: "Invest more money in developing renewable energy"; "Stronger policy for pollution and higher taxes for big companies"; and "invest in urban planning with an ecological perspective".

Other students felt that change can be fostered by incentivising citizens and businesses and supporting grassroots initiatives. Students acknowledged that education is key for any behavioural change and hence suggested that authorities “invest in good (Climate Change) education” directed at “the public, not just kids, (so that) ... people know what is being done”.

Some students felt that the root of the problem is that Climate Change has a low priority in the authorities’ political agenda, either because they think the whole issue is a hoax or because they are not fully aware of the threat it poses. Students further suggested ways in which this can be addressed. The authorities need to “educate themselves on the issue” and get their facts right by “collaborating with (Climate Change) experts”. Students also suggested that policy makers need to “listen to the public and the environmental organizations” to ensure that the common good is addressed through their decisions. Furthermore, considering that “global climate change is hard to tackle”, the authorities need to “cooperate with other states” to create a global alliance. This is of particular importance for small states.

Discussion

The results indicate that the EduChange methodology was successful and had a considerable impact, not only on the knowledge base of the participants, but also on the development of their skills and attitudes towards Climate Change. They felt this to such a degree that all the students said they will include this approach in their own teaching methods. The international dimension of the project seems to have provided tangible and lived experiences of how Climate Change impacts the lives of people in different countries. This face-to-face encounter with the realities of Climate Change seems to have been more effective than the traditional teaching / learning methods.

The students’ main preferences regarding learning activities was for those that provided first-hand experiences (preferably in the field) and opportunities for active learning. The level of popularity of an activity with the students was dependent on its level of student engagement and on how relevant it was to their needs (i.e. what they consider important for their teaching career), or a combination of the two. It is worth mentioning the importance students ascribed to the education of all age-groups – including policy makers – in an effort to bring about effective change towards sustainability.

Students participating in the project not only acknowledged that Climate Change is real, but they were quite knowledgeable concerning its far-reaching implications. This was evident in their consideration of ‘important’ SDGs and in the behaviour they chose to adopt in their day-to-day lives. Of particular interest was their concern for the need for a radical change in the predominant paradigm of development that puts economic interests above the needs of people and the planet. However, the students’ low scoring on SDGs such as No Poverty, Reduced Inequality, Zero Hunger and Good Health and Well-being might be an inherent unconscious bias of the EduChange project that might have dealt with Climate Change predominantly from an environmental perspective and less from a development perspective. Students unambiguously advocated for policies that favour environmental health over economic growth. Nevertheless, students did not fall for the sustainability myth, that “consumer choices and grassroots activism, not government intervention, offer the fastest, most efficient routes to sustainability” (Lemonick, 2009). While acknowledging their role as consumers, they provided several scenarios through which the authorities could support grassroots initiatives towards actively combatting Climate Change.

Conclusions

This chapter analysed the EduChange project and its effectiveness as an education for sustainable development (ESD) initiative. The study showed that the careful choice of educational experiences relevant to the learners, as well as teaching and learning approaches that actively involve students in their learning, can lead to the development of skills and attitudes conducive to a sustainable lifestyle.

One limitation of the study is that it refers to the responses obtained from a set of 22 students and, as such, it cannot be regarded as comprehensive. However, bearing in mind that the sample encompassed all the EduChange cohort over one year, it enables a profile to be built concerning the extent to which EduChange affected the students.

One clear conclusion to be drawn is that the methodology adopted by EduChange is effective and should become more conspicuous by expanding its focus to other areas of the SDGs. This is particularly relevant during this particular period characterised by the covid-19 pandemic, which has been likened to “*watching the climate crisis with your finger jammed on the fast-forward button*” (The Economist, 2020, May).

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