CLIMATE EDUCATION with HANDS-ON SCIENCE at SCHOOL

CLIMA-KIT

NEEDS ANALYSIS REPORT

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TABLE OF CONTENTS

EXECUTIVE SUMMARY

Within the scope of the Climate Education with Hands-on Science at School (Clima-Kit) project, this needs assessment was conducted to identify gaps, challenges and opportunities that could guide the implementation of the project in schools. In the research, 26 in-depth interviews were completed, including 9 experts, 12 teachers and 5 students.

The main findings of the study are grouped under six topics and 30 subtopics. The summary findings under these topics are as follows:

- Teachers knowledge and competence levels on climate education vary. However, teachers, experts and students all agree on the importance of climate education.
- While teachers are familiar with concepts closely related to climate education, the specific term ‘’climate education’’ is relatively new to them.
- There is no established curriculum for climate education within the education systems of both Turkey and Belgium. Consequently, climate education activities in schools rely on the initiatives of school leaders and teachers.
- Ministries of education in both countries create opportunities for cooperation with various partners, especially NGOs and universities, and encourage individual and institutional initiatives. However, these initiatives and incentives are considered insufficient, particularly by experts.
- The following recommendations are provided concerning the extent and focus of the Clima-Kit project activities:

  - The curriculum should have a spiral structure adapted to the age level;
  - It should progress in a framework that will cover more complex issues of climate education;
  - It should be in connection with all subjects, not just science;
  - The content should start with the younger age group as much as possible;
  - The content, when integrated with knowledge, skills, and competencies should aim to produce practical and actionable result;
  - It should encompass content that has a direct impact on daily life;
  - It should give students a say and be rights-based;
  - It should be sensitive to socio-economic inequalities and cultural diversity.

- Experts and teachers concur on the importance of employing a diverse range of educational methods and techniques in practice. Additionally, while emphasizing hands- on science education as a foundation, they also stress the significance of complementing these processes with digital implementations.
- The significance of mitigating the development of eco-anxiety and increasing sensitivity was frequently emphasized. To achieve this, there is a suggestion to concentrate on finding solutions to the issues at hand.
- The integration of the entire process with the school culture was also underscored by both experts and teachers. Within this framework, the role of school leaders was emphasized as pivotal.
- There is a lack of sufficient equipment and materials, especially for teachers. Additionally, teachers require learning environments that can enhance both their content knowledge and pedagogical content knowledge.

The final section of the report provides recommendations and key takeaways based on the findings of the needs assessment. These recommendations and findings pertain to both the Clima-Kit project and potential future projects.

INTRODUCTION

In an era defined by the climate crisis, equipping youth with climate literacy, green skills, and a comprehensive understanding of climate change is essential for promoting a sustainable future. The Climate Education with Hands-on Science at School (Clima-Kit) project seeks to address this pressing need by establishing a climate literacy education programme, developing teaching and learning materials, establishing an open-source digital platform, and building the knowledge and capacity of teachers.

This needs assessment report presents a comprehensive analysis of the current state of climate education in schools and education systems in Belgium and Türkiye, identifying the gaps, challenges, and opportunities that can guide the effective implementation of the Clima-Kit project. Through an in-depth evaluation of teachers', educators', and experts' needs and demands, and student readiness with regard to climate education, the need assessment research team aimed to offer an effective and tailored approach to climate education programmes and materials, as well as the strategies and tools to disseminate them.

The report consists of four parts. The first part presents the aim and scope of the project. It then outlines the outputs of the project, explaining the role and significance of the needs assessment.

In the second part, the methodology of the needs assessment is introduced in detail and the stakeholders involved are presented. The needs assessment was conducted using a rigorous methodology to provide a comprehensive understanding of climate education.

In the third part of the report, the findings and results are presented from a broader perspective which will ultimately provide guidance throughout the project. The needs assessment also revealed strong findings that can pave the way for achieving the expected outputs and outcomes, responding to the demands in the field, while shedding light on the current state of climate education in schools in Belgium and Türkiye.

In the final part of the report, all the findings were outlined with a general discussion to highlight the recommended aspects to pave the way for the implementation of the Clima-Kit Project.

PART 1

ABOUT THE PROJECT

1.1. The Aim and Scope of the Climate Education with Hands-on Science at School Project

Climate change is one of the global issues that cause far-reaching environmental, social, and economic consequences with devastating impacts on ecosystems. Within this scope, climate education plays a vital role in terms of informing children about the causes and effects of the climate crisis, encouraging them to change their attitudes and behaviours, equipping them with green skills, and helping them to make informed decisions. To this end, Climate Education with Hands-on Science at School Project aims to:

- establish an education program that enables children to higher climate literacy, be equipped with long-green skills, and supports climate-friendly behaviours,
- design a digital and hands-on science instructional materials and tools based on UN SDGs that can be implemented in the classroom for 8-12-year-old students,
- execute the developed educational programs with the students in the schools within the project consortium through the facilitation of teachers.
- increase the knowledge, competencies, and literacy of teachers on climate change.

1.2. Target Groups

The project has two main target groups that are teachers and 8–12-year-old children in Belgium and Türkiye.

1.3. The Project Outputs and Significance of the Needs Assessment

The project has three main outputs, including a needs assessment report, a training program, and a digital platform. The need assessment, which the present report is based on, is conducted with the participation of experts, teachers, and students to understand the needs of educators and students via in-depth interviews in French, English and Turkish. The training program, composed of three different training modules, includes teacher guides with instructions, hands-on science experiments, non-experimental activities, and e-learning tools. The digital platform contains digital versions of the training modules as well as other materials, information, and documents about the project.

The needs assessment research is the foundation of both the training module and the digital platform. It provides critical insights into the needs of the target audience and requirements of climate education, thereby providing feedback on the design and content of the teaching and learning materials. Through the feedback obtained from the needs assessment, the training module can be tailored to address the identified gaps, seize the opportunities to offer a holistic scope, and be refocused according to the unique needs of teachers and students.

Similarly, the structure and design of the digital platform will be directly shaped according to the findings of the needs assessment research. This ensures that the platform is engaging and accessible to all by considering the preferences, expectations, and educational needs of the target groups. In order to provide a rich educational experience, this comprehensive analysis makes it possible to integrate teaching guidelines, hands-on science experiments, non-experimental activities, interactive elements, and e-learning tools such as games, interactive activities, quizzes, audio-visuals, and videos, into the platform based on the needs and requirement of the teachers and students.

PART 2

METHODOLOGY OF THE NEEDS ASSESSMENT

2.1. Methodology & Sampling

This needs assessment relies on a qualitative research design, carried out between 30th May and 28th June 2023. Initially, 30 interviews were scheduled, involving experts, teachers, and students. However, four participants withdrew their participation later, resulting in a total of 26 in-depth interviews being completed. Subsequently, no new participants were recruited due to data saturation.

The in-depth interviews, lasting approximately one hour each with the experts and teachers and approximately half an hour with the students, were conducted via Zoom. The nationalities of the experts, teachers, and students are shown in Tables 1, 2, and 3. Other demographic characteristics are summarised below.

Table 1. The Profiles of the Teachers Interviewed

Code	Country of Residence
Teacher_1	Türkiye
Teacher_2	Türkiye
Teacher_3	Türkiye
Teacher_4	Türkiye
Teacher_5	Türkiye
Teacher_6	Belgium
Teacher_7	Belgium
Teacher_8	Belgium
Teacher_9	Belgium
Teacher_10	Belgium
Teacher_11	Belgium
Teacher_12	Belgium

Of the teachers, 7 were female and 5 were male. The distribution of teachers according to their profession is as follows: 6 science teachers, 4 classroom teachers and 2 other branches. As far as their teaching experience was concerned, 3 of them have 10 years of experience or less. The number of teachers with 11-15 years of experience was 4 and the number of teachers with 16 years or more of experience was 5.

Table 2. The Profiles of the Experts Interviewed

Code	Country of Residence
Expert_1	Türkiye
Expert_2	Türkiye
Expert_3	Türkiye
Expert_4	Türkiye
Expert_5	Türkiye
Expert_6	Belgium
Expert_7	Belgium
Expert_8	Belgium
Expert_9	Belgium

Of the 9 participating experts, 8 were female and 1 was male. While the number of experts aged 35 and under was 4, the number of experts aged 36 and above was 5. Among the participants, 4 work in NGOs, and 5 work as teacher educators at a university. Out of the participants, 6 graduated from the faculty of education with a bachelor's degree, while the other 3 participants graduated from the departments of biology, economics, and geography. Additionally, 3 of the participants had 10 years or less professional experience, while 6 participants had 11 years or more professional experience. When considering their experience in the field of nature or environmental education, there were 5 experts with 10 years or less of professional experience, and 4 experts with 11 years or more professional experience.

Table 3. The Profiles of the Students Interviewed

Code	Country of Residence
Student_1	Belgium
Student_2	Belgium
Student_3	Türkiye
Student_4	Türkiye
Student_5	Türkiye

Out of the 5 students who were interviewed, 4 were female and 1 was male. Furthermore, three of them were 11 years old, one was 10, and one was 12.

PART 3

THE NEEDS ASSESSMENT RESEARCH FINDINGS

3.1. On the Concept of Climate Education

The following section delves into the diverse perspectives of participants regarding climate education. Participants have offered their unique viewpoints and provided an understanding of the implementation of the Clima-Kit Project, the need towards climate education and broadened the framework drawn for it. However, this diversity also poses challenges in referring to a consistent framework, scope, and content, while reflecting the confusion surrounding the term "climate education". Therefore, this part of the report will explore the participants' viewpoints on climate education and the reasons why they consider it crucial. Then, how and to what extent climate education is sometimes mistaken for sustainability and environmental education will be presented.

3.1.1. The teachers demonstrate varying degrees of knowledge and familiarity with climate education.

The teachers who participated in the research have demonstrated varying degrees of knowledge and familiarity with climate education. Analysing the responses of the teachers, it becomes evident that teachers have only become familiar with the term in recent years. Despite the significant number of teachers who were initially unfamiliar with the term 'climate education', they confirmed that they had incorporated climate education into their teaching practices, without explicitly linking it to the term itself. Those who heard about climate education, on the other hand, were mostly experts who have been working in similar fields, such as sustainability and environmental education, in universities or NGOs. This indicates that climate education should be promoted and disseminated among teachers as a distinct field.

Teacher_7: No, I think the term climate education, it's like something I heard for the first time this year … But of course, it's not because I didn't know the term. I wasn't aware of the fact that it was important to work around it (as a separate field).

Teacher_12: I guess when I started (teaching about climate education) five years ago, that was already in our education (program).”

Teacher_8: I never called it climate education in my classroom, but I regularly (teach my students) and (they) ask lots of questions about climate because they listen to news, TikTok, YouTube (channels) … But I don't call it climate education.

Teacher_5: I am actually now hearing the concept of climate education from you in exactly this way. When I think of climate, I think of global warming, climate change, changing weather events, all those things (come to mind).

Teacher_1: I haven't actually heard of it (climate education) as a concept. I have heard the concept of climate literacy before. It must have been about five years ago. Climate literacy, science literacy, environmental literacy, sustainability, sustainable development. I have heard of those, for example.

3.1.2. Although responses indicated varying degrees of knowledge and familiarity with the term "climate education," the common theme was the importance of educating students about climate change, its consequences, and practical actions to address it.

Although teachers were not quite familiar with climate education as a separate field, they acknowledged the significance and relevance of climate education for addressing and responding to contemporary global challenges regarding climate change. Participants mostly perceived climate education as the responsibility of teachers to raise awareness about climate change and its impacts, and also about how they can contribute to the mitigation of climate change risks. Compared to teachers, the knowledge and experience of experts in this field is quite high. The consensus between teachers and experts who have a better command of the subject that climate education should be given more room in school education shows the importance of the Clima-Kit project's goal.

Within this scope, participants underlined the need for students to understand climate change and its consequences, like global warming and its effects on biodiversity and ecosystems. Some participants emphasized the importance and urgency of climate education in terms of the significance of actions that students can take as future generations. Within this scope, participants had a pragmatic approach toward climate education. Therefore, the answers given to the question of why climate education is important and why it should be in the educational programmes align with the meaning they attributed to climate education. Some of the statements on the importance of climate education are presented. As depicted below, some participants recognised the importance of climate education not only for future generations but also for the Earth itself by overcoming the limitations of the anthropocentric perspectives that are dominant in the field. Therefore, it is advisable for the programme developers of the Clima-Kit project to clearly address and reverse the anthropocentric approach to climate and the environment.

Teacher_7: There are students striking for climate change. I think this is a very good thing because they are (on this issue) right. Right now the adults are the ones who are not fulfilling their responsibilities... If we don't teach children about the problems with climate change, they won't be able to react or take action because they won't understand why it's so difficult to take action. So first and foremost we have to teach them, we have to make them understand how important it is.

Teacher_12: They have to know what's going on in the world, why are people protesting, what's wrong and what problems they are facing because they are the (adults) of the future.

Expert_3: It is important to communicate with children because their transformation will actually lead to taking good steps towards the future.

Teacher_3: There is a greenhouse gas effect, acid rain, and a decline in the diversity and populations of plants and animals. There is also a lot of over-consumption and unnecessary consumption. We should first try to make our students aware of these issues and then try to guide them.

3.1.3. The level of awareness about climate education and the level of knowledge on climate change cause the concept of climate education to be frequently confused with sustainability and environmental education.

Although participants had a consensus on the importance of climate education and climate literacy, there was confusion about what constitutes climate education. After further discussion, it is revealed that their limited familiarity with the term makes it hard for them to draw a framework for climate education. Consequently, the varying levels of awareness and knowledge about climate education often lead to the confusion of the concept with sustainability and environmental education.

For example, Teacher_3 took environmental education as a reference when discussing their efforts on climate education at school and expressed it as follows:

Teacher_3: For example, there is a forest very nearby. It's a very large natural area, provided for animals without disrupting their natural habitat... We organise trips to this area.

This confusion was less prevalent in the expert interviews. The contrast between the expert and teacher interviews could potentially arise from the teachers' limited grasp of climate education and climate change, whereas the experts possess a more profound content knowledge in this domain.

Conversely, it's important to highlight a fundamental aspect that is innate to the interrelationship between sustainability and environmental education. The participants, particularly the experts, underscored the interconnectivity between these subjects, emphasising the need for this interplay to be integrated into educational and training endeavours through the lens of systems thinking.

A case in point is the discussions with Expert_6, who argued that climate education shouldn't be considered in isolation from sustainability since sustainability works as a comprehensive overarching concept.

Expert_6: Don't really use the word climate education in my class because I think it's a bit narrow. … I use the (concept) "sustainable development education" and I have a (wider scope for) climate education… I think most of the organisations I know use sustainable development but have a big focus on climate.

Furthermore, Expert_3 conveyed the importance of making a link between climate education and environmental education, using examples from their studies. They emphasised the key role of starting the subject by embedding it in nature, as described below:

Expert_3: When we talk about climate change, we always include nature observation and getting to know nature in the first activities of each level. Because, first of all, we aim to activate the senses and make the child realise the nature around them.

Expert_1 highlighted that, in accordance with contemporary trends, the conceptual framework is now being built around 'sustainable life skills'. As related concepts are synthesised under the umbrella of 'sustainable life skills', it is considered crucial to recognise them as integral parts of a larger whole. Recognising this holistic perspective is considered to be vital and raising awareness of this interconnectedness among all stakeholders is thought to be immensely beneficial.

Expert_1: Climate change has now become a topic in the MoNE. MoNE is also moving towards more sustainable life skills literacy... It primarily includes ecological literacy. This means understanding nature. If this does not happen, all experts have agreed that children will not be able to understand climate change, loss of biodiversity, pollution, drought, etc.

In conclusion, there is a need to establish a conceptual framework for climate education when developing the educational content of the Clima-kit. However, it is suggested that this conceptual framework should not be exclusionist but rather should be of a design that makes students aware of the intersections and interactions with neighbouring concepts, especially nature education and sustainability.

3.2. Climate Education as an Agenda of Education Systems

This section focuses on the analysis of the contextual framework and extent to which climate education is incorporated into the Turkish and Belgian education agendas. It is evident that climate education is not comprehensively and systematically integrated into the educational systems of both Türkiye and Belgium; rather, it is only partially included in the curricula. As a result, various initiatives from individuals, teachers, schools, experts, and NGOs play a crucial role in bridging this gap. This section examines both the efforts of ministries of education and their limitations regarding climate education while also outlining the scope of initiatives undertaken by participants and NGOs that they know of.

3.2.1. In the absence of mandatory climate education in the curricula, the responsibility lies with schools and teachers to integrate climate education into the teaching processes.

According to the participants, the integration of climate education into mainstream education practices faces a significant challenge due to the lack of authority to secure its place in the curricula. During the interviews, it became evident that the integration of environmental education in general and climate education in particular relies heavily on the proactive efforts of educators and schools.

In Türkiye, the Ministry of National Education plays a central role in setting the curricula for all schools on all subjects. However, private schools have the flexibility to supplement the compulsory curricula by incorporating additional materials and content into their educational processes. Private schools display a competitive approach as they strive to expand the range of their educational offerings. As a result, private schools prioritise providing additional learning experiences, especially on topics that may not be covered in depth in the official curriculum, such as climate education.

Expert_2: If you are not a student in a private school, if you are a student in a public school, unfortunately, you don't have much awareness about these concepts (climate change).

Expert_3: Even though private schools are schools affiliated with the Ministry of National Education, I hear people's individual initiatives as there is no content for different grades.

Expert_4: In public schools... I have volunteered a few times, but we can also be there as part of the lessons... The work done in civil society and public schools is mostly short-term, game-based workshops... If there are other opportunities offered by the private sector, there may be a chance to spare more time to teach things more comprehensively.

In the Belgian educational context, teachers and experts explained that the Ministry of Education and Training establishes framework curricula that serve as guiding standards for schools. Subsequently, schools exercise autonomy in selecting specific educational programs in line with the fundamental objectives outlined in them, a process facilitated by educational networks with which schools are affiliated. In addition, the responsibility of selecting textbooks, content and teaching materials is delegated to schools for which they depend on private publishing houses. As a result, the selection of educational networks and private publishing houses by schools, in addition to proactive initiatives by teachers, is of key importance in the integration of content and materials related to climate education into mainstream education practices.

Nevertheless, in both countries, climate education persists due to the efforts of experts and teachers who actively engage in the subject. Educators undertake climate education in accordance with the objectives set forth by their schools and also integrate their personal initiatives into the teaching process. Down below teacher observations within this context are presented.

Teacher_11: The objectives are present in our curriculum, and we have quite a lot of them in this curriculum, but they are really mixed up in this curriculum into different subjects. And I think it could be a good idea for these policymakers to group them better. So the teachers will see more clearly what are the objectives to work on this climate education problem…We have eight objectives, for this age group. Next to these final objectives, we have a proper curriculum in our school network. Our school network develops its own curriculum, and this curriculum is more concrete and has a lot of objectives that we can use in this project.

Expert_7: The minister says, it (climate education) has to be in the program. But it does not get that big of support. There are schools (that) really implement it very (effectively). But there are individual programs. They are not overall (holistic).

Expert_9: (There are) networks of education, and work independently from each other… And you have a curriculum on a national level. These are the objectives every 12-year-old should reach… And then you have the networks (with) their own objectives. … There's also a network of independent schools. … All these networks have their own programs, and they occasionally support schools in their education. Most of the time it's about the environment… Teachers also inform and inspire themselves (through) other online sources. …

Despite the lack of a comprehensive and dedicated approach to climate education by educational authorities, it is important to acknowledge that they are not entirely indifferent to the matter. Recognizing the significance of climate education, these authorities have attributed a crucial role to its incorporation into educational systems. Consequently, participants emphasised that authorities make efforts to support educational projects and provide some kind of content, although not fully holistic, sustainable, and all-inclusive. The following section will present an overview of the endeavours undertaken by various authorities in this regard.

3.2.2. Rather than providing and implementing a comprehensive and holistic curriculum on climate education, ministries of education create opportunities for collaborations and encourage both individual and institutional initiatives.

Rather than providing and implementing a comprehensive and holistic curriculum on climate education, ministries of education provide partial and limited support for climate education. Mostly, ministries of education create opportunities for collaboration and encourage both individual and institutional initiatives. In many cases, climate education is being implemented by non-governmental organisations (NGOs) through a variety of projects. Ministries of education often collaborate with NGOs through protocols and partnerships, and actively support and participate in them. This is particularly evident in Türkiye, where NGOs are taking the lead in designing and implementing projects and initiatives. These efforts aim to provide students and school communities with knowledge, raise awareness, and promote attitudinal and behavioural changes related to climate change. In addition, the focus extends to enhancing the knowledge and skills of teachers in this area.

With regard to climate education in Belgium, the ministry of environment and its affiliated bodies are said to be showing greater commitment compared to the Ministry of Education and Training. Moreover, civil society initiatives were pointed out for undertaking remarkable activity and underlining the importance of the issue in Belgium. These initiatives are instrumental in generating educational content, carrying out activities and implementing practices aimed at raising awareness, disseminating information, and promoting public involvement on the issue.

In both cases, however, the dissemination of climate education is more limited and restricted as a result of this decentralised, multi-stakeholder approach. The second limitation is that the protocols and projects mentioned generally emphasise nature education, which is also linked to the lack of conceptual framework detailed in section 3.1. Therefore, the need for civil society initiatives, open-source content and materials becomes even more prominent. In this context, as a civil society initiative, the Clima-Kit project may benefit from integrating the issue into the educational agenda.

Expert_9: When it comes to climate education, most of the initiatives and practices for education are drawn up by the Ministry of Environment. They have a lot of websites. There is an organisation that is independent but financed by the government. They give training to schools in terms of knowledge building, but also in campaigns, and actions.

Expert_5: I know that they (the Ministry of National Education) have a lot of protocols... There are also programs for teachers, programs that reach children through teachers. ... The Ministry has developed a project on sustainable life skills. These are developed for preschool, primary and secondary school children, and implemented by teachers... The Ministry works with civil society organisations and signs these protocols with civil society.

Expert_8: It's a nice thing that there's, for example, a movement in Belgium that is called Grandparents for the Climate. And it's just a civil movement. But they are also engaged in education, in climate education.

3.2.3. The participants believe that endeavours of educational authorities are inadequate in their scope.

The efforts of the ministries of education are considered inadequate because, despite some recent initiatives and projects related to climate education, there are concerns about the effectiveness, duration, and extent of these efforts on climate education. While there have been some attempts to introduce climate-related topics within the curriculum, it has a limited scope and is restrained in a single subject such as life sciences classes.

Expert_2: Especially in recent years, the Ministry of National Education has conducted different projects on this issue. ... They prepared a document on climate change, and I can say that a curriculum framework has been roughly created, especially in primary school. However, until now, we can say that the issue has been addressed only in the environmental context within the scope of science education.

Expert_1: There is an elective course on climate change in secondary school. (Explaining while talking about the work of the commission on climate education) We talk about how it should be structured. We talk about how climate change education should be adapted to the curriculum. The issues we are talking about here are things that I have also shared orally and in writing. I think the existing elective course should be preserved in secondary schools, but its content should be reorganised. Because it is very low-profile. The potential for that course to be implemented is also very low.

Teacher_4: We do not stick to the curriculum. We already relate it to the curriculum; we always extend beyond the curriculum in our school. Because I don't think the curriculum is very satisfactory. There is some information, but it can be lacking in terms of application... I think the curriculum should be enriched a little more and include some activities for children with real implementation.

3.2.4. NGO's and universities assume a leading role in delivering climate education, but their endeavours lack a strong focus on this particular area of education.

Civil society is showing a growing emphasis not only on climate literacy and education but also on broader environmental education and literacy programs. In the interviews, apart from the practices of a few organisations, there was no information about any projects directly related to climate education. It can be seen that the studies of NGOs and universities on climate education are limited in scope and number. Some of the exemplar initiatives undertaken by the NGOs, experts, and teachers include the following:

Expert_2: I generally see project-based activities or special courses and private meetings organised by individual leaders. If you ask where I have seen these, there are courses in Bursa, Istanbul, Ankara, Mersin and Denizli... There are also camps in winter and summer. But on a yearly basis, I have friends who organise regular forest groups throughout the year, at least on the scale of Istanbul.

Expert_6: We have quite some organisations who have made stories in which you can start to do the steps… So a lot of organisations have. I think mostly they focus on one aspect within the climate. It's not the entire climate, especially when it's with young, younger children. They focus on an element. So yeah, I think there's some material. Maybe not about the climate in its whole.

Teacher_5: So we do projects to create curiosity and awareness.... For example, we had a project last year... It was the first project of a training... Ten teachers, ten different classes, ten different age groups of students in cities in Türkiye or in other countries came together and we worked on a topic that we determined every month. The project we conducted last year was about the environment.

Expert_5: In the field of climate education, seminars are frequently organised. When it comes to climate education, there are mostly workshops. In other words, there are people who have worked in this field and whose reputations can be trusted. They give seminars either for children or for adults. But in addition to that, the private sector actually has a proper course. This means one thing. For example, the insurance sector is the sector that will be most affected by climate change. It must therefore warn its future employees, the expectations of the new generation and its customers about this issue. ... I think X (an NGO) is doing a good job in this respect. They are all over Türkiye. Y (another NGO) has now gained some momentum.

Expert_2: X (a university) has prepared a program to be implemented in its K-12 college. ... We had an academician and another teacher. They worked together to prepare the program. This program was prepared for the 8-12 age group as a climate change program and curriculum. It seems to be exactly equivalent to what you are working on right now, a project prepared in line with the primary education curriculum... There is another centre associated with a university. They are currently doing a project. They are running a project within the scope of climate change that will enhance children's knowledge and participation within the scope of children's rights…. I have not yet come across a piece of work that I can describe as highly qualified and that I can point to as a leading example.

Consequently, there is an urgent need to promote and expand the content and programmes for climate education. The Clima-Kit project plays a critical role in addressing the urgent need for broader and more comprehensive climate education initiatives.

3.3. Climate Education and Curricula & Implementation

This section focuses on the characteristics and qualities of curricula to be developed for climate education. Experts and teachers differ on how climate education should be implemented in schools and what needs to be considered when implementing it. The reason for this diversity is that experts and teachers emphasised the aspects and qualities of school implementation based on their own pedagogical approaches. This diversity of opinions and perspectives has been reflected in the sub-sections and under each subsection the rationale and context, if available, has been defined.

3.3.1. The programme to be developed should be age-appropriate and adhere to the spiral structure of the curriculum.

Participants were asked about their perspectives regarding the appropriate extent of climate change and climate education programmes to be presented to the 8-12 age group. In order for climate education to be more effective and disseminated to wider beneficiaries, participants argued that the curriculum should be associated with the existing ones, and developmental characteristics appropriate to the age level should be taken into consideration.

Teachers and experts put a great emphasis on the necessity of designing a learning process compatible with the spiral structure of the curriculum. The second prominent topic was the necessity of considering the cognitive skills of the 8-12 age group. The scope of the learning objectives to be integrated into the programs was discussed by the participants during the interviews. Some of the suggestions provided in this context are presented below:

Expert_2: This age group is generally in the concrete operational stage, primarily between the ages of 8 and 12. After the age of 11, although it is the stage of moving to abstract operations, developmentally, children are in an age range where they have very intense needs related to structuring knowledge, learning knowledge, deepening knowledge, making discoveries, curiosity, and at the same time they want to experience the satisfaction of participation, it is incredibly valuable for them to be involved in the processes like an adult, to have a say in there like an adult, and to take part as an actor in the activities.

Teacher_7: I think you should go in like any kind of educational program. If you decide to start a program at eight, it should be at a very low kids' level. Explain what's going on with if we don't like our garbage, for instance, then I don't know how to say it. ... And so that could be something like a small project you can work around with young kids even at six, seven. And then of course, … the global message is more for the older kids because I'm a teacher in the fifth and sixth grade, which is like a nine, ten, 11 years of age.

3.3.2. Climate education should start from the basics and move towards more complex scientific concepts and interconnected environmental issues.

Constructing information and knowledge on climate education step by step is considered essential to helping learners comprehend the subject more effectively. Participants explained that climate education involves complex scientific concepts, interconnected environmental issues, and accompanying socio-economic implications. By breaking down these intricate topics into incremental steps, learners can grasp fundamental concepts before moving towards more advanced aspects. There are opinions that climate education should be structured by establishing the interrelationship and its connection with neighbouring concepts. The importance of the interrelationship between the neighbouring concepts discussed under Subsection 3.1.3 is also reflected in expressing thoughts on the appropriate extent of climate change and climate education. Moreover, it is suggested that a gradual approach allows educators to tailor the content according to the cognitive abilities and developmental stages of learners, promoting a deeper understanding and engagement with the subject matter. These aspects are complementary for adherence of programs to the spiral structure of the curriculum and its age-appropriateness dimensions detailed above.

Teacher_1: The (climate education related topics in) science curriculum provided to teachers by the Ministry of National Education is between the 3rd grade and the 8th grade. So, in the 3rd grade, they start to learn a little bit more about the world, about the planet, its layers. In fact, they begin to define what pollution is in the 5th grade. For example, they begin to define the environment, and what the environment is. They are introduced to concepts such as ecosystem, ecology, biodiversity in the 5th grade... In the science curriculum, we have topics specifically related to the environment in the 5th and 8th grades. In the 8th grade, there is the topic of climate and weather events in the first unit. The greenhouse effect, climate change; it's a bit late to learn about these (topics)... So, let me put it this way, I actually think it should be in a way that progresses in a spiral approach and taught incrementally at each level.

Expert_1: I think the level of knowledge children ... have at the time is very decisive on this. ... I don't believe that when we focus on "What is climate change?, “What are the causes and consequences of climate change". Children cannot adapt and develop behaviours or attitudes... If we aim for children to have a system-oriented approach in education, to look at and understand the world based on system thinking…, (then) it is necessary to talk to children about the systems in nature, the parts of those systems, the functions of the components, the balance in that system, the limitations in that system, and to allow children to observe these. ... I think we should start from these points first, and then gradually explain that climate is one of these systems that create life, and how that climate affects other systems. Once you understand this, you can actually give an answer to the "Why should we conserve climates?”. I think it would be healthier to start with the question of climate change (that is)“Why shouldn't they (climates) change rapidly?".

3.3.3. Climate education should be embedded in the curricula of all subjects.

Rather than emphasising short-term activities and short learning periods, participants stress the importance of a continuous learning experience that is embedded in the curriculum. This approach is regarded as more beneficial for students to effectively acquire the essential objectives, knowledge, skills and competencies related to climate education.

Expert_4: I have also worked in civil society, although almost all of them have the same things... There is a big difference between working with a child for five days and two hours. You know, when you spend those 5 days together, if you want to create and promote a behavioural change or raise awareness, of course, you are luckier. But when we present something in two hours, it is necessary to present it very properly. Because it may also have a negative effect.

Expert_7: Maybe I would try more to open it up to other examples in the world. Maybe that's the first one. Secondly, I would try to enhance the program throughout the whole year, throughout the whole school. Now, it was just a program for six weeks, so. And it starts. It stops… I would make it more like some things that they have to do the whole year or that it's getting into the program more deeply.

3.3.4. Climate education should start as early as possible.

Starting climate education as early as possible is particularly found important since students are more receptive to attitudinal and behavioural change at this stage. In addition, students are more likely to adopt responsible behaviours and make informed decisions that have a positive impact on the environment and society regarding climate education. Participants stressed that by building a strong foundation for climate literacy early on, middle school students can become informed, well aware of the challenges, and actively participate in shaping a more sustainable future.

Teacher_4: It is already in our curriculum, but only in the curriculum. Academically, I think it is much easier to give this information to primary and kindergarten, rather than to secondary school students. When we get to secondary school, it is a bit more difficult to change behaviours because the children have grown up a bit and certain behavioural patterns have been established. That is why we need to go further at the secondary school level by showing the students the real results through the problems we experience in our daily lives. ... For example, when we get to the middle school level, while we can do these processes very easily in the fifth and sixth grades and transform them into behaviour, we have a little more difficulty in the seventh grade, but the eighth grade becomes the most difficult group.

Teacher_6: I find it very important to teach (climate education) even before the age of 8.

3.3.5. Climate education should be interdisciplinary

Participants highlighted that the programme to be developed on climate education should be a fundamental component of every curriculum as it is an interconnected issue that crosses traditional subject boundaries. By adopting an interdisciplinary approach, students can gain a holistic understanding of the whole issue and make necessary connections with various matters that are affecting climate change from different aspects. In addition, interdisciplinary climate education equips students with the knowledge, skills, and attitudes needed to address climate issues, while acquiring a mindset on the issue of climate change in order to respond and show the flexibility that it requires when tackling complex problems it causes.

Expert_1: Of course, integrating these contents into all interdisciplinary courses. But again, I'm not just talking about climate change. In other words, ecological crises should be addressed on the basis of system thinking. We are talking about this. The Ministry is just outside of this. By the way, I said too much about it and then climate change became a topic in the MoNE. The MoNE is also moving towards more sustainable life skills literacy.

Teacher_4: At the beginning of each year, we prepare an action plan. All the departments, ... (and) our social studies teacher talks about what has been done in the past about environmental education and the works published about it. Our maths teacher prepares recycling problems. Or they have solved problems about energy saving, for example, by associating it with carbon footprint measurements... Our physical education teachers organise bicycle tours ... Our art teachers create a new product with the waste collected by our students instead of using new products.

3.3.6. Knowledge acquisition should go hand in hand with skills and competencies and climate education should be action-oriented.

Participants also prioritised the development of practical skills. However, some experts equally found it crucial to acquire the necessary foundational knowledge about climate science and environmental issues based on system thinking. It is argued that after gaining essential knowledge, learners can build a strong foundation for a nature-conscious mindset while equipping them to act responsibly and to make informed decisions and climate-friendly choices.

Expert_6: I think you have to do that on their level. But I think at the age group 8 to 12, don't underestimate them. They are already quite capable, I think they understand a lot of things. So, I think focusing on knowledge first or transferring knowledge, also emphasising on… system thinking. It's not something that is out of the blue. You have to know that this has an impact on that and that there are a lot of factors. We have economics, we have social, we have migration, we have ecological studies that are connected to climate change. Then also, um, value development I think is the exact translation, but about knowing what the values are and maybe making choices. (Making) choices for yourself is one of the main focuses… Then emotions, knowing that there are emotions involved within this. … And then action. Take action.

A concrete action with a vision. And it can be very small with children, I think. But after all this input, I think we need to have an action element as well.

Complementary to balancing knowledge and skills aspect, participants highlighted that climate education should also adopt an action-oriented approach to empower students with basic competencies regarding climate change. By focusing on knowledge and skills, students can actively engage in problem-solving acts and make climate-sensitive choices while assuming responsibility.

Expert_9: (It is necessary) not only being aware of but also giving knowledge objectives, but also integrating other objectives like giving them the opportunity to analyse research, to brainstorm, to explore other perspectives, to engage with problems and to be able to explore other ideas to give their opinion about it. I think that it is important to integrate (it into the curricula of other subjects) and of course, you cannot ignore the basic knowledge.

Teacher_2: This period is a concrete operational stage for children, so saying that climate change causes the following effects may actually be a bit blurry. As much as possible, children need to... (say) "Oh yes, this is what is happening." via small experiments. ... Then they will be much more aware of everything. So ... if I do a test and an experiment here, if I see an effect, I can (say) "Look, this is how it happens in our world". Even after that, when it is supported with various videos and photographs when its effects in the real world are shown, then it can be very effective. In other words, I think that at this stage, children definitely need to do something, see the results and (acquire) these achievements starting from what is closer to them.

Teacher_4: It is necessary to show students something real and concrete. Visual videos can be used to show a problem, the seriousness of what is happening, its consequences, and what might happen in the future... Really serious problems are happening all over the world.

3.3.7. Climate education should encompass content that has a direct impact on daily life and provide a connection with nature.

Strengthening children's relationship with nature was often mentioned as one of the aspects that should be included in climate education. Teachers and experts also emphasise that climate education should encompass content that has a direct impact on daily life and helps students to feel connected to nature. The experts, in particular, highlighted that the curriculum should establish a connection between students and nature which is of great importance in primary school children. It is argued that this approach develops a complete understanding of the interconnectedness of humans, nature, and the environment. Furthermore, a sense of belonging to nature can encourage students to protect it and motivate them to take an active role in this process.

Teacher_11: Every aspect of this climate education is very important. Bring them in touch with nature, bring them in touch with animals, with plants, with the importance of this.

Expert_5: It is actually the age when he/she is newly acquainted with the world, he/she breaks away from the family for the first time and goes to school. There, they form networks for themselves and start to live in a community. ... In other words, basic skills such as loving nature, embracing nature, trying to protect it, empathising with animals and treating them well should be absolutely essential.

Expert_9: What is so interesting about it and that's… climate education is not only about talking about the gases and the CO2. It's also about linking it to daily life, to topics in your daily life (such as) transport, nutrition, the way you build your houses, the way you design gardens, the way you build and design cities.

Expert_7: I will try to answer what the aim is for the kids (between) the ages of 8 and 12. My aim would be to (have them) explain how it happens, how it gets worse and what a person can do about it. And that if they do something, eat something, or play with something they will think about "What is the impact (of 'this') on climate change now ?". If you can teach that, it would be very nice.

The complementary aspect of this dimension is having learning experiences in nature. Within natural environments, participants asserted that students can engage in experiential activities outside of the traditional classroom setting, benefit from meaningful and impactful learning opportunities as well as hands-on learning experiences, while deepening their connection with nature and developing their environmental awareness on-the-spot. This aspect was also discussed in Subsection 3.4.2.

3.3.8. Climate education should be interactive and give students a voice.

The program to be developed is suggested to be interactive, taking into account children's needs and giving them a voice. It is also found important to encourage children to act and build their confidence. Learning activities that focus on these aspects help children to develop socially and gain self-confidence while learning about climate literacy.

Expert_4: In other words, it should be interactive, the child's right to speak should not be left behind, their needs should be taken into consideration, and if the child needs anything, they need to be heard. Apart from that, encouraging them to take action themselves... Creating this courage is the main issue. Those who pay attention to this aspect, raise themselves. In other words, they socialise. They also gain self-confidence. Anyway, if the aim is to provide education to children, it is necessary to ensure their personal development related to the climate so that the child can do something when they grow up. You know, just knowing is not enough for something, it is necessary to take action.

Expert_2: In other words, we want them to express their opinions, to give (them) space, to give them the opportunity to speak .... If we are doing practices in the open field, and I often work in the open field, (I want) to enter the forest as much as possible with the children by asking permission from the forest, that is, (I want) to perform rituals. In fact, when leaving the forest, it is (necessary) to thank the wolf, the bird, the sky, the cloud, the sun, the earth, and maybe even create an altar area for it... Children also participate in this way. They have very funny answers. It is a great pleasure to watch them. It is a great pleasure to record them... Therefore, we should ensure that the child's voice is heard in educational programmes as much as possible.

As a complementary aspect, participants emphasised that the learning process should be designed to encourage participation and promote a sense of belonging to a community to take collective action while taking cultural and individual diversity and inclusion into account.

Expert_8: Climate education, in the long term, is about how to relate to the world. But the part of it is also this being able to take action and, you know, like how to be a rebel, how to confront the system and maybe how to engage with others, how to find each other. When you have this same idea about things that need transformation… People finding each other for the same topic, (having) the same values… But that's a real-life tool that they can use to gather people around the same just cause that will adjust for them. But that's collateral about what are the dangers if you do that? If you join, what can happen if you join it?

Expert_9: But we know that it's a challenge to engage everyone in the classroom. It's a topic that matters, that is important and matters to everyone, not only a certain group of people.

3.3.9. Climate education should be rights-based.

Experts and teachers emphasise the importance of the active citizenship aspect of climate education because it empowers students to become informed and engaged participants. This involvement is not only argued to enhance their understanding of climate issues, but also to provide them with a sense of agency and empowerment, allowing them to become proactive agents.

Expert_2: Especially in the context of children's rights and children's participation, that is, in the perspective of participation, I think it is important that the child ... has an idea of how he/she can act both with non-governmental organisations and in terms of public order, with which adults he/she can share his/her proposals for solutions to the problems he/she has identified and noticed, and how he/she can carry out a movement he/she has initiated with the participation of other adults. Unfortunately, the context of children's rights and child participation in this sense is not yet fully understood in Türkiye... (There is a need to) discuss how participation is possible in the field of children's rights and protection...by protecting the child, but also by creating space and opportunities for the child to participate and by making them aware of their rights. In fact, the crisis of children's rights is also a climate crisis.

3.3.10. Climate education should be sensitive to socio-economic disparities and cultural diversity.

During interviews conducted with teachers and experts in the schools participating in the Clima-Kit project, a noteworthy contrast emerged between the institutions, primarily rooted in socio-economic disparities. The school in Türkiye, where the Clima-Kit initiative is enacted, is a private school, thus fostering a heightened awareness of the subject within the school community, including external members such as families. As a result, environment-friendly and climate-conscious behaviours are notably prevalent.

Conversely, the school in Belgium, where the project is also being implemented, has a moderate socio-economic background. In this context, the consumption patterns of the school community, especially the pupils and their parents, seem to be more restricted. Interestingly, their relationship with nature differs from conventional expectations, with comparatively lower levels of environmental and climate awareness. A Belgian teacher highlighted the following perspective when discussing the attitudes of pupils and parents.

Teacher_7: The city where I work is a city where the social (economic) level is not so high. So, it means that there are lots of unemployed people in the city. People don't have so much money. When the parents have to choose between a banana of, let's say, €1 and a big package of cookies of €1 which can last for one week, they choose that option (latter). So, I see that some kids have a hard time understanding what I'm talking about because they don't have a social background (for that). And that's why we are a bit responsible as teachers to share them. But of course, when there's no follow-up at home, it's hard.

Socio-cultural differences were another facet of the differences between schools. This context highlights the potential need for the project implementation process to adopt a responsive strategy to socio-cultural differences. This may include actions such as taking into account the unique circumstances and characteristics of the local community. To illustrate the need for socio-cultural responsiveness, Expert_5 offered an example from a project implemented in Türkiye, while Expert_1 addressed cultural diversity with reference to the materials (see also Subsections 3.4.2. and 3.6.2.) and eco-anxiety (see also 3.5.1.) that are detailed in the following sections.

Expert_5: Izmir offers more plastic projects. Because the child sees plastic all the time. However, biodiversity projects are more frequent in the east. Because children can see the nature around them, the birds, how to protect the birds, or the epidemic pollution in front of us. We need to change the perspective of the West a bit and get them to spend more time in natural areas and explain that nature is everywhere. We also need to invest more in the East.

Expert_1: Meanwhile, we are making the following mistake: we are taking books on climate change from abroad, translating them into Turkish and putting them on the market. Unfortunately, some NGOs also do this. There is also a cultural dimension to climate change. We always talk about locality... I opened a book, I bought a comic book, I couldn't even read it. I thought about how a teacher could share this book with children, the questions that would come from the children and how these questions would be dealt with. Texts that would pave the way for very serious eco-fear. They definitely need to be adapted.

A complementary dimension focuses on the injustice of the climate crisis. Some experts and teachers consider it important for children to learn that climate education has different impacts on different countries and different disadvantaged groups and that climate injustice is experienced accordingly. However, it was emphasised that difference and injustice in this context should be ensured without creating eco-fear, as described more extensively in 3.5.1..

Teacher_2: We did a more recent activity. ... Here we had a scenario. The scenario was like this: in the 21st century, you live in Mersin, you are a family of farmers, you have greenhouses, but you have no access to water... In fact, there are millions of people who live in incredibly fertile lands, but they have no access to clean water. At least I share these things with them, frankly. I also know the kind of inequality that women and girls in particular are subjected to, because finding water seems to be the duty of women and girls... There is also a certain socio-economic group. Maybe they think they can have everything. After all, there are children. I mean, they really can get anything. It seems easy to them, they don't understand how the process works....

Besides socio-economic and socio-cultural differences, a similar comparison was made by one of the experts on the contrast between the two countries. In this context, the expert highlighted the impact of Türkiye's relatively lower level of development, suggesting that this may adversely affect the country's receptiveness to climate education initiatives. However, the expert expects that Türkiye's geographical location should compel it to take a more proactive stance on the issue. The expert articulated this position as follows:

Expert_2: Perhaps because we live in the middle latitude, we do not yet see the effects of the climate crisis very widely. In other words, because of our geographical location, it may not be fully understood that this is such a critical and important issue. … When we talk to people, we often hear the following: "I will bear the brunt of what the big states do". … This is the widespread language of politics. There is something big that needs to be solved. … There is a mess, a ball of confusion. But there are also people who are trying to take serious steps.

3.4. Learning Environment and Teaching Methods: The place of digital & hands-on learning in climate education

This section explores participants' perspectives on the learning environment. Within this context, participants highlighted the merits and drawbacks of both face-to-face and digital instructional approaches. Subsequently, this section delves into the extent to which climate education can involve experiment-based and hands-on learning approaches.

3.4.1. Participants compared the advantages and disadvantages associated with face-to-face and digital teaching methods, while also considering their conditionality.

The rise of digital transformation has profoundly impacted the education sector, particularly in the course of the COVID-19 pandemic.

Both students and educators have been engaged in a diverse array of offerings and opportunities, facilitated by digital tools and platforms. However, participants indicated that several factors related to socio-economic disparities, pedagogical approaches, socio-emotional needs and expectations influence the extent, frequency and circumstances under which digital tools and implementations bring advantages or disadvantages. Throughout the interviews, participants compared the advantages and disadvantages associated with face-to-face and digital teaching methods, while also considering their conditionality. None of the participants had a black-and-white point of view when it comes to teaching methods, rather all acknowledged both the usefulness and limited nature of face-to-face and digital implementations under different circumstances. Due to confusion about what constitutes climate literacy, participants often brought forward their experiences in environment and sustainability education while discussing digital and face-to-face learning.

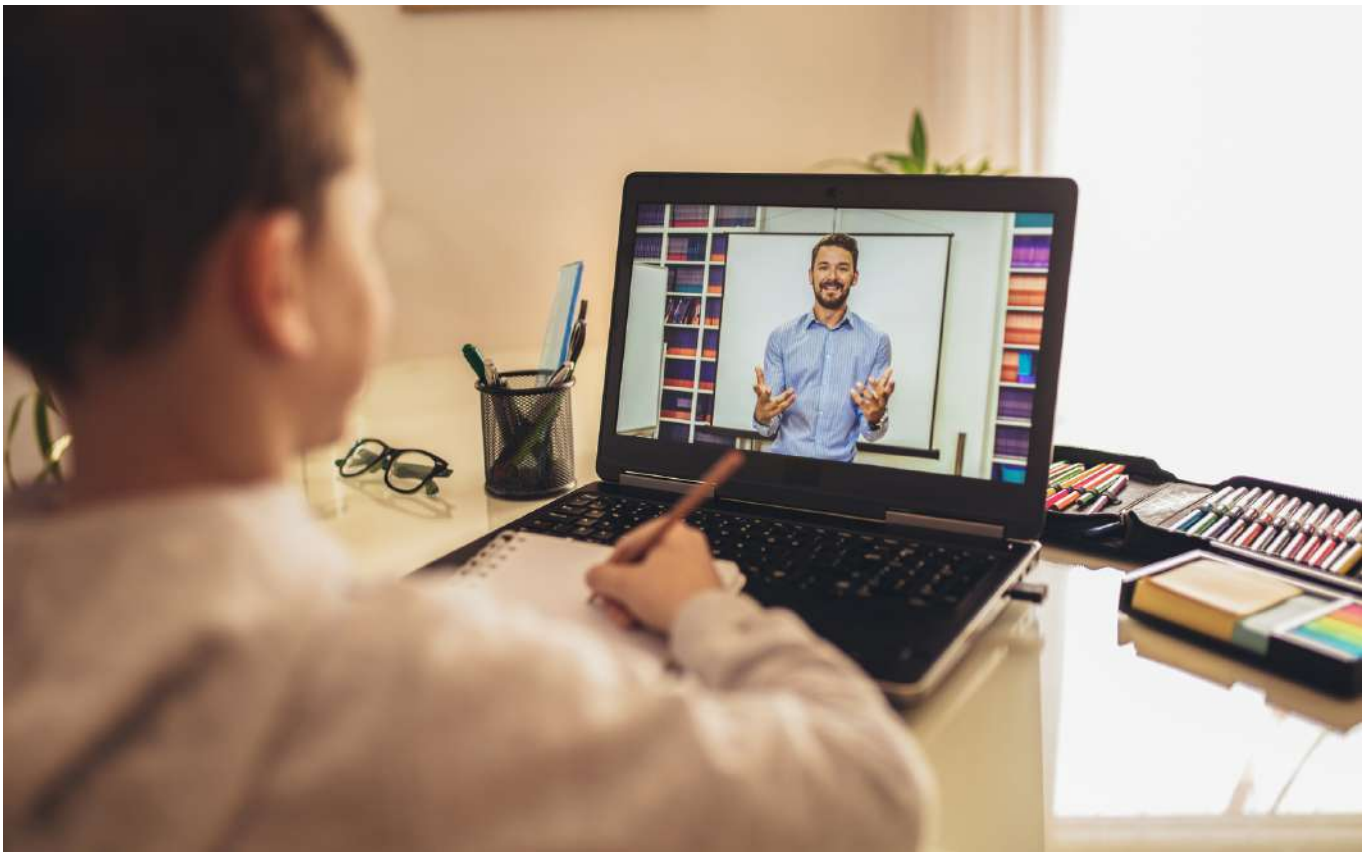
First and foremost, participants emphasised the advantages of digital learning and implementations, and they offered four main reasons. Firstly, educators recognised that digital platforms and tools offer a remarkable degree of flexibility, thus expanding the reach and accessibility of educational content to a broader audience. Secondly, participants pointed out that digital materials and platforms cause less carbon emission and waste which is particularly regarded as important in climate and environmental education. Thirdly, the availability of online platforms that are enriched with diverse learning and teaching materials brings multimedia resources to the educational and teaching experiences, thereby enhancing individualised learning for students and facilitating lesson planning for teachers. Finally, another important point that emerged from the discussions was the potential of digital tools to promote a deeper understanding of various regions, countries, and cultures, thereby offering learners a global perspective and fostering intercultural awareness of climate/environment issues. The following examples provide why digital tools and implementations are thought to be effective.

Expert_5: We mainly use digital modules. ... We don't have a lot of printed material. In other words, (we preferred the digital) for two reasons: one is to make it more accessible, and the other is the cost of producing and mailing paper. .... We don't feel comfortable with materials that add to the carbon footprint. ... If there are schools like village schools or disadvantaged schools with limited access to the internet, we can do different things for them.

Teacher_2: Obviously, they (see things) that they cannot see in nature, at least not in their immediate surroundings; our children, for example, have never seen a cow in their lives... Anyway, you have the chance to show them all... Some animals (have) very interesting sounds; I heard them for the first time there. I think even that is a contribution. ... I mean, it appeals to something else, I think it appeals more to emotions.

Expert_7: If you do it digitally, you can also share it with people in other countries. For example, they can learn about Scandinavian countries where it is already normal to have solar energy and other energy, or you can even go to less developed countries... If it's digital, it's eye-opening, so you can connect better with the whole world. (But) if it's on paper, it stays in your classroom.

Expert_1: It also makes life easier for teachers. I think digital content that can also use the existing equipment in the classrooms should be used. After all, there is such a space and children are there. Only one side of these contents should be to direct them to nature, to make them curious about nature. When we talk about climate change, of course, digital content can be better for using less resources.



Participants also recognize the advantages of face-to-face activities. First of all, participants put a great emphasis on the interaction aspect of face-to-face education and implementation. This method allows for direct and personalised interaction between educators and learners which ultimately increases the engagement and active participation in the activities and learning processes. Teacher_4 pointed out that the activities they carried out remotely and through digital tools during the pandemic period "remained unfulfilled" and that all processes could be observed if they were implemented at school; and that the participation rate was 50% during the pandemic period and 90-95% in face-to-face activities. She also added that during the face-to-face activities, students, teachers, parents and other school community members created a synergy that brought them together for collective awareness and action.

Teacher_4: In face-to-face education, we achieved such a synergy in the waste competition that it became more of a competition of parents than a competition of students. ... We identified ratios and a certain success score... We rewarded our students... We did not give up carrying on with the online activities, but we could not achieve effective results as much as we did in face-to-face.

Expert_6 and Teacher_11 emphasised the essential contribution of interaction between students and being in the same place together. However, Expert_6 also drew attention to the digital habits of the 8-12 age group and stated that to make the educational process more engaging, both digital and face-to-face activities should be integrated in the process. Teacher_11 and Expert_2, on the other hand, draw attention to carrying out face-to-face and on-site applications which is consistent with the expectations towards the program to be interactive, fostering and encouraging collective action, individual voice, and a sense of belonging to a community and nature (as detailed in Section 3.3).

Teacher_11: I think it's important for children to go outside and experience the world outside. I don't know how you could do that in a digital environment.... Of course, you can bring them in, you can bring them in touch with (things) or you can let them see a lot of materials digitally that are difficult to see here and reach here. But it's more important to go outside.

Expert_2: But at the end of the day, coming together face-to-face in an open space, rather than sharing in a digital environment, of course, makes a very serious difference. ... Undoubtedly, face-to-face practices are always more effective.

A complementary hybrid approach toward face-to-face and digital activities and learning was also a common theme among participants. One of the reasons why participants favour a blended approach is related to the role of teachers and educators as supervisors and mentors which ultimately ensure the quality of the learning process. Expert_1 explains this dimension as follows:

Expert_1: Instead of printing worksheets, seeing the digital posters, and talking about it during the breaks, playing games on the smartboard, doing homework on the computer, it may vary according to the student profile, but if there is an observation study, children can follow and write their observations there. As long as it can be in the classroom and guided by an adult, I am in favour of it.

This dimension is also a complementary aspect of the complex nature of the climate education content. As Expert_8 expressed face-to-face interaction, dialogue and discussions can help students have a deeper understanding of the issue, while also acknowledging the supplementary functions of digital methods and tools.

Expert_8: In climate education, as in sustainability, education in general, it's a complex matter. In complex matters, it is even more important than in learning to exchange ideas and engage in conversation and dialogue. So, there are some advantages in working digitally because you can visualise better maybe. And each individual student has a voice… I don't want to talk aloud in the classroom, on my computer. I can do it, and I can. I can think along with the group. So that's a real advantage digitally… So, I think that climate education cannot be digital education only. It needs to be blended and there really needs to be a dialogue in classrooms face to face.

One of the experts stressed that which method to be preferred by the teachers depends on the learning objective at hand. Within this context, teaching and learning strategies should be compatible with the learning objectives of the program to be developed in the Clima-Kit Project.

Expert_9: I think it all depends on the way you organise your digital learning environment and digital objectives might be inspiring as well because it has to do with creating a blended learning context using online tools. I think it all depends on the objectives, the competencies you want to work on. If you want to work on very specific social competencies, then face to face activities are much more… And it also depends on the extent of experience of the students when it comes to online tools. For example, if you want to analyse a topic related to climate change and you want to analyse causes and consequences, then you need a very good online drawing tool to outline and draw these causes and consequences and build up a mind map… So it has not really to do with the content, but it has to do with the objectives and it has to do with the extent of experience of your students.

The notion of compatibility between methods and objectives must be considered in terms of the digital competencies and skills of the learners. Just as the targeted outcome for the students must be compatible with the method, the tools to be used within the method must be compatible with the digital competences and skills of the students. Expert_8 elaborates on this aspect as such:

Expert_8: Yeah, I agree that there's this technical difficulty for students that it's really a condition if the tool, the digital tool is too difficult, then the energy and the focus of the students will go to the technicality of the technical details… And then the climate education part will be lost because they cannot do all things that are difficult at the same time. So I think this is something that really needs attention, if the digital parts are fluent with it, then education, climate education can take place.

3.4.2. While hands-on learning is recognized as essential for enhancing teaching quality, the understanding of how to effectively incorporate this method into climate education remains limited among the participants.

Based on the interview findings, experiment-based/hands-on learning emerged as a crucial method for participants to enhance the quality of teaching and learning processes. The dialogues concerning experimentation and hands-on learning again overlap with the fields of sustainability and environmental education. In this context, experts and teachers illustrated many examples of learning activities they have implemented so far, however, it is seen that these examples did not constitute hands-on learning based on a methodological approach. In other words, they are not quite aware of the technical aspects of these methods. When it comes to the relationship between climate education and experiment-based/hands-on learning, it is seen that their perspectives remain relatively narrow and limited in scope. Whether the participants are teachers or experts, their understanding of how to effectively incorporate this method into climate education remains limited.

One of the comments on the importance of experiment-based and hands-on learning was that these methods provide permanent learning and allow students to take responsibility. On the other hand, it was also mentioned that there are disadvantages in terms of finding materials and content. While Expert_4 mentioned the pros and cons, his approach revealed that he has a limited understanding of the relationship between climate education and experiment-based learning. (For more detail on teachers having limited access to resources and materials also see 3.6.2)

Expert_4: (When it is experiment-based) 80 to 70% (of the children) usually take responsibility. (Otherwise,) there can be things like forgetfulness... And, excitement; in other words, it is something that directly satisfies experience and curiosity... These are the advantages, I guess; the disadvantages are that there may not be materials, ... there may be financial problems, ... (the materials used in the experiment) turn into potentially dangerous objects. But I had no idea how to do something experimental with the climate.

Despite the lack of a clear framework to delineate the relationship between climate education and experiential learning, an additional observation on the merits of hands-on learning is presented below. The implementation of hands-on learning activities poses a particular challenge in the field of climate education. This challenge can be attributed to the complex nature of the subject matter, which consequently leads to difficulties in developing appropriate teaching content. This view is supported by two teachers (Teacher_2 and 5), who are particularly well-versed in experimental/hands-on learning methods, explicitly stating that they did not prefer using these methods in teaching climate education.

Teacher_5: We didn't do any experiments about it. I mean, I'm thinking about our activities, we didn't do anything under the name of an experiment. ... We didn't think of it. Of course, I would like to. First of all, observation is very important in experiments. The child observes. He/She sees that something he/she observes changes as a result of the experiment. ... Because when you say "experiment", observation is involved, and they write down the results of their observations. ... I think permanent learning is more effective in experiments because they are the results of their own observations.

Teacher_2: Nope, we haven't done any (experiments). ... I'm thinking, I mean, there might be a place that I've missed, of course, but I don't have any experiments that I'm doing on this (climate change) right now.

Nevertheless, it is also clear that there are various constraints, limited competency in finding and developing hands-on implementations and limited access to experiment materials specifically for climate education. The only participant who reported that she was teaching experiment-based climate education mentioned that she was able to implement these methods because she had access to the content and materials. This shows the advantage of having ready-to-use content and materials for teachers to continue their practice with these methods which ultimately is a valid suggestion for the Clima-Kit project. However, the deficiencies of participants in the content knowledge, including this participant, in climate education, become more visible as the interview progresses.

Similar to the teacher mentioned above, another teacher also talked about their recent experience with a ready-to-use experiment kit. Although it was for hands-on science education and she had not started using these kits in her classroom, she considers such experiment sets functional and promising as she also mentioned that hands-on learning increases student engagement and it is favoured by students.

Teacher_6: I received a kit from Children's University. I haven't done the activity yet, but it looks very interesting. The box contains all the tools to conduct an experiment on colour molecules in nature, together with the whole class. The science box contains materials to carry out the 'autumn colour chemistry' activity with up to 30 students.... These are activities that children really enjoy. They're curious and want to understand their environment. Children also like them because they can do a lot of mixing and matching and don't have to listen to a traditional lesson.

Teachers who have carried out experiments and hands-on learning activities in their classrooms have pointed out various limitations when talking about different examples. Two of these examples are given below. In the first example, one of the limitations was the difficulty of doing such activities with older age groups due to the exam-based education system and the presence of high-stakes exams. In the second example, it is mentioned that the participant could not allocate enough time for experiment-based practices due to the intensity of the curriculum.

Teacher_4: For example, we have more experimental activities in the 5th and 6th grades, and I can spend more time on experiments in the 7th grade. As you know, academic concerns in our country slow us down in the 8th grade.

Teacher_3: But honestly, since I work with very small groups, we have one hour of class per week since we have 40 minutes to explain a subject first, then get feedback from the students and then do these experiments to make it more efficient. I have about 22 or 23 hours of lessons with each class. One hour at each grade level. ... I don't have time, to be honest.

A third example of this issue was the lack of materials and adequate learning environments. For the learning process to be based on experiments and hands-on learning activities, it is indicated that learning environments must be designed and equipped accordingly. Within this context, the differences and disparities between schools are mentioned in subsection 3.3.10. should be taken into account, especially for the Clima-Kit project in terms of developing content for the identified beneficiaries. Because, if the target audience is mass schools and the project adopts a catch-all approach, then the content, learning environment and materials that integrate hands-on learning activities into education processes must be simple, easily accessible, replaceable and inexpensive. If the target group is schools with greater capacity and opportunities in terms of materials and learning environments, then the content can be more advanced and enriched.

Teacher_8: My colleagues who give science courses, talk about. Show them some experiments about climate change. But I think it's not enough because we don't have much material to show them how it's.

Teacher_9: But not really for the moment. It's more in the community. At age 12, they go to another school here in Belgium and there's more place for experience because they have more classrooms with the equipment. We don't really have equipment to do those things. But I think the older children do it in the classroom with little experience with water or so, but not really about climate change.

An additional issue arising in the discussion on the experiment-based teaching methods was highlighted by an expert well-versed in the subject matter. Within this context, it was emphasised that an exclusive reliance on experiment-based approach should be avoided, advocating instead for taking the advantages of various methods and techniques encompassing both theoretical and practical facets to enhance instructional efficacy. This dimension also intersects with the complex nature of climate education discussed in sections 3.3.2 and 3.6.2.

Expert_2: During the pandemic period, we focused on integrating the educational concepts related to sustainable transition into the curriculum of the preschool education programme. … Although our meetings took place in a digital environment due to the subject matter, it was still valuable to share our videos, photos, examples and field experiences with them digitally. We always started with our practical experiences when preparing the content, even though we couldn't do any face-to-face training due to the pandemic, because we felt that combining theory with practice was crucial. … In my opinion, what enhances digital applications is the personal practical experience of the trainer. When you bring your real-life experience into the process and share it, it has a much more powerful effect.

After considering these discussions, the idea that hands-on/experiment-based teaching methods should be favoured becomes evident. Yet, there's a notion that it would be more balanced if these methods complemented the teaching process based on the quality of the learning objective at hand. Additionally, the hands-on teaching content to be generated by the Clima-Kit project is anticipated to serve as a model for all stakeholders in climate education, addressing the current deficiency in the field. Participant’s feedback suggests the importance of offering practical guidance to all the educators involved in climate change education, helping them develop teaching content effectively and enhancing their competencies in this area.

3.5. Climate Education & Pedagogy

This section explores three key issues regarding the relationship between climate education and pedagogy. Firstly, participants discussed the pedagogical aspect of climate education against the risk of inducing eco-anxiety in students. Secondly, the role of educators was discussed within the scope of pedagogical approaches. Finally, the importance of promoting a climate-conscious school culture was addressed by the participants.

3.5.1. To tackle the risk of causing eco-anxiety in students, climate education should be based on a solid pedagogical approach and present the climate problem as a global issue with potential solutions.

According to the results obtained from the educators, the feelings and attitudes of students towards climate change and the crisis vary. It was stated that some students were concerned and saddened by the extinction of animal species due to climate change. They feel empathy towards animals and are worried about their survival. However, they do not always experience intense anxiety or fear; their emotions are more aligned with empathic feelings about nature. Although they can be regarded as exceptions, educators mentioned that in every classroom few students feel stressed and anxious about climate change, especially those who hear news or discussions about climate crisis more often. Teachers have reported that those children worry about the future and the potential consequences of climate-related issues.

Conversely, educators pointed out that there is also a small percentage of students in each class who exhibit indifference towards the climate crisis. This lack of concern might be attributed to the absence of strong environmental values at home or school. Another reason behind this lack of concern might be the age of the students. Some educators pointed out that in smaller age groups, the climate crisis is an abstract concept that ultimately prevents them from being emotionally involved in the situation.

The level of concern and sensitivity among students appears to correlate with their exposure to information about the causes and consequences of the climate crisis, as well as their understanding of the environmental impact of human actions. Teachers and parents play a significant role in shaping students' attitudes and emotions regarding the climate crisis. Providing accurate information, promoting environmental awareness, and emphasising individual responsibility can help reduce anxiety and encourage positive actions among students.

The participants emphasised the essential role of pedagogy in climate education. They addressed the issue of eco-anxiety, warning against portraying climate change as a frightening crisis that could hinder children's development. Instead, they stressed the importance of presenting climate education as a scientific reality with potential solutions. This approach allows educators to provide children with essential knowledge, skills, and attitudes without overwhelming them with problems beyond their capacity. Therefore, participants stressed the significance of developing content and teaching strategies in a manner that does not trigger or nourish eco-anxiety, rather ensuring a positive and supportive learning experience while giving age-appropriate conceptual frameworks and responsibilities.

Expert_5: There is always a narrative about climate in terms of crisis. In other words, there is always a narrative that the world is going to end and that there are critical thresholds. Civil society seems to support this a little bit... But I'm not sure that it reaches children or the public. And of course, from a pedagogical point of view, this has to be presented to children with scientific reality and solutions, not with a doomsday scenario.

Expert_4: I think the climate issue has been conveyed in such a way that it has had an impact on people's psychology to this day. In the last two years, some steps have been taken about eco-anxiety. Apart from that, I think that there should be solutions about what can be done, instead of just saying "climate change is like this" (based on) information... I think it is more necessary to show what to do, what is the right thing to do. Of course, I am not sure what they can do in their own lives. I mean, individual transformation can be transferred later, but only after explaining that there is a solution... There was a documentary, I forget the name of the documentary now, but if we consider this documentary as an education, it is a very bad education. It is a terrible thing. Because it only scares and there is no real solution to it. So, the education shouldn't be like this.

Expert_6: It is also important not to just focus on the negative because that could be hard for the children. I'm following an exciting course on behavioural psychology. If we focus on the negative too much, we will switch off. ... If you use it as a positive/active word, it could make a difference. It is proven by psychology, advertising, and science. If you want everybody on board about climate, we should not only focus on the problems but also the positive (things).

Expert_2: (We should) try not to cause a phobia in them. "'Oh no, we are losing the planet and what are we going to do? We are just children. Our body is so small and it's too heavy for this body to carry the responsibility for this." .... However, it is a very difficult situation to overcome. Because in order for the child to grow and develop, he/she needs to look to the future with hope and it is of a quality that will not take away that hope. In fact, I think it is critical to share and to open up areas of action for the child, to create times and grounds where they can be active and participate. It is very critical to create sharing spaces where the child's voice will be heard.

Teacher_1: I see anxiety. Maybe in the last 5 years or so, since these issues have been on the agenda a little more, the activities and contents related to the subject in the curriculum have been enriched over time... The things I have shared: here are how much plastic waste has been generated in these many years, this much water has been polluted or many animals have become extinct, etc. Since the story goes to the negative side, I think that maybe it creates anxiety in children because I do not constantly share improvements.

Teacher_7: No, they don't. But I know a few kids in my class. When we talk about it, I see them like, a kind of panic reaction in their eyes. It's the same effect as when we talk about the war in Ukraine... But it's only a few. Like I have two classes of 23 kids and maybe I would say like five kids in the two classes which I know. This could be kids who don't sleep at night because they are thinking about it.

Teacher_6: I don't get the impression that the children are anxious, and unfortunately, they don't feel anxious. Often, they think the teacher is exaggerating.

Participants' views on the intensity of children's concern for nature or their insensitivity may also vary according to observations made or pedagogical perspectives adopted. The contextual and situational diversity of the educators' thoughts on this issue may also explain the differences in their observations. One of the differences in this context can be seen in the alternative views that expressions such as eco-anxiety or apathy to nature are incompatible with the age level of the children.

Teacher_11: Insensitive, perhaps. Anxiety? I don't think so. And I do not know of many children who have eco-anxiety here at school and I won't say that we have a lot of children who are insensitive about it. But the age of the children is an age in which they want to play, and they want to have fun and it's difficult to make them reflect on the impact of their actions on our climate... And some of them are more sensitive to it than others. And what we can do to reduce this insensitivity... Continue focusing on this respect and these activities about climate education, gardens, animals, and the plants and impact of the weather etc.

Some participants emphasised the importance of providing children with accurate, science-based insights into climate change. They stressed the need for educational settings that raise awareness of potential issues and empower students to engage with them, without raising anxiety. This perspective is consistent with discussions in earlier sections (see 3.3.8. and 3.3.9.), where educators argued that fostering active citizenship skills in children requires providing educational material that not only cultivates their willingness to act, but also encourages them to actively participate in initiatives and to be willing to take action. The case in point was presented in the following statement:

Expert_5: My deepest wish is to discuss them, to talk about them with scientific focus. And I see this among young people, especially at the high school level. Young people speak, give seminars, etc., without educating themselves about climate, without reading publications on the subject. Misinformation is circulating between cities in a popular way. I think this is very dangerous. There are very important developments going on in the world. There are common misconceptions and so on. We have created young people who talk about climate without being climate literate. I think we should look at ourselves in the mirror. We may not be able to prevent it now, but we shouldn't create a monster out of it. What I want most is to give young people the initiative... But at the same time, they should learn to respect, love and consult their mentors. Because they have started to consult and that may go wrong. The age of 8-12 is good to give initiative, but it is also good to give these training sessions. If we create chaos between generations, it can become a social thing.

Teacher_4: Obviously, we instil a little anxiety in the insensitive ones. You'd better be a bit worried. ... I showed a film to a group of students who I thought were insensitive. Interstellar, you know, life ends on Earth.... What are the problems here? There are problems waiting for us in the future, what would you do if you were you? By associating it with our daily lives, we expect those who are not worried to be a little worried, and we expect them to do something about that concern. Because I always say, I am 40 years old, I will live another 20 years, the future is yours and your children's.

3.5.2. In climate education, students should be supported and encouraged by teachers and educators undertaking the role of a mentor, instead of maintaining the traditional teacher-student relationship.

The way educators position themselves in relation to climate education tends to be limited to mentoring. Teachers often see themselves as facilitators of student learning rather than in a traditional teacher-student relationship, especially when focusing on climate education content to be implemented in middle and high school. When it comes to learning about climate change, action seems to be more important than knowledge. Therefore, teachers prefer to see themselves as mentors who can provide individual support and encouragement to students. Educators point to a process of education in which students take the initiative in their own learning process and teachers support students when they have difficulties. They emphasise the importance of such an education so that students feel that they are making a difference through their actions.

Expert_5: Let them (children) take the initiative and we will know where to stand. As their teachers, parents and someone who learns from them, let's learn to improve ourselves when they ask... And then to guide them where they have difficulties. For example, municipal cooperation. For example, children want to say something to the municipality. Then we can help them on how to reach the municipality... Because everyone now wants to hear something from children, to help them, to support their ideas. Because they are the main creators. This is also called reverse mentoring. Children actually tell adults what to do.

Teacher_1: It is actually very critical to see that the knowledge acquired there leads to change at a certain point in life. We should contribute as much as possible to the structuring of knowledge, but we should also equip the educational environment with the resources to access this knowledge. First of all, what sources and references can they draw on? As a teacher, I put myself in the position of a guide and I have to follow their experiences as much as possible.

An expert referred to the dimensions, components and perspectives that teachers should take into account in the climate education process, as well as the aspects in which educators can improve themselves, based on her practices with educators.

Expert_2: If you are working with adults or working with a group of adults who will work with children, I decided to follow a path where I will work with them intensively on the perspective of children's rights and participation, and then work in depth on those environmental, socio-economic and socio-cultural contexts. And within this decision, it is also very critical to enrich that content not only with a theoretical narrative but also with practical implementations. In other words, I care about experiencing a daily flow, sharing a period or an activity flow together with adults. During this experience, I care about prioritising the scopes that they will follow by placing that connection in their world where they can connect with the subject they work on or the structures they work on.

3.5.3. Under the guidance of the principal and the school community, students can develop a climate-conscious mindset as the school culture undergoes transformation.

The school culture and the leadership of the school principal play a crucial role in conveying implicit messages about climate education. Parallel to the mentorship and providing guidance to students, school culture which requires engagement and dedication of the school community under the leadership of the principles can transform the perceptions regarding climate change and initiatives that the community can take. Within the scope of climate education, it is underlined that small changes in everyday life and best practices in schools can reinforce the values of sustainability and a climate-conscious mindset. Among the participants are those who state that these implicit actions will complement teachers' formal education efforts in the classroom and contribute to establishing a holistic approach to climate education in the school setting. Therefore leadership is seen as important as mentorship when establishing strong relationships with students overreaching traditional teacher-student relationships. Expert_9 delves into these aspects in detail as presented below:

Expert_9: Schools where the principal, the school principal is also involved and engaged and everything. You have all the didactic interventions that a teacher does towards the children in order to teach about education, to (teach) them, to create opportunities for them, to learn how to be a good system thinker and be a critical thinker and all these competencies. That's one part. What the teacher does (is) the other part, and that's about the school culture. And that's a more implicit way of climate education. But it's really important because it is the kind of implicit message that you send as a school that is really important… I think the strongest practices are those where climate education is integrated into the pedagogical vision of the school as if there is a whole school approach. And it's not just a topic that a teacher brings to the children like... The weekend starts and next week we will do another project. And climate change is no longer on the agenda. That is not a strong practice. The strongest practices are those where you have the whole team of the school working together.

3.6. Climate Education & Educators

Within the scope of this needs assessment, participants were asked about the fundamental needs and demands of educators who implement teaching activities on climate education in general. This section also explores and presents suggestions and good examples for improving teaching processes and addressing the needs of educators. Findings in this section overlap with the previous sections because all the needs and expectations regarding climate education have a reflection on the implementation side of the matter which ultimately affects the educators. Therefore, this section presents the previous issues and findings from the perspectives of teachers and all the educators implementing climate education or related subjects while portraying the impacts of these issues on them.

3.6.1. Despite various individual efforts and endeavours, educators are still facing a notable deficiency in adequate and comprehensive programs in climate education implementations.

The most referred need of educators was identified as the notable deficiency with adequate and comprehensive programs in climate education implementations. As detailed in Section 3.2, there are several main reasons why climate education practices are limited and not sufficiently disseminated. From the teachers' point of view, the lack of adequate and comprehensive programmes for climate education ultimately set them back from developing further content and material. The participants from Belgium explained that the core curricula have been under revision and climate education might have been given more room in the new design. However, they did not have a certain knowledge about it. In this context, the participants referred to the development of a programme based on a broad framework for climate education with its defined subject scope, learning outcomes, and teacher guidelines.

Expert_5 emphasised that the number of human resources and climate education stakeholders who can work on the development of the program and practices is very limited saying: “I mean, I think the programs are very good, but their numbers can be increased. Also, there are very few people on the civil society side who are interested in education. I mean, we are actually a handful of people." At this point, it is described that the creation of a program, framework and guidelines would be facilitative for teachers, enabling the widespread dissemination of climate education, as expressed in the following statement:

Expert_5: We can direct teachers, point by point, do this, do that... When you give them an action plan, a hundred-item action plan, a time plan, important dates for nature, etc., we know that it is implemented when you give them a set of guidelines. It is only the teachers who get lost on the way, who don't know where to go, or who don't want to deal with it in time. By establishing systematic programs, by offering incentives to teachers, by following these actions, you can reach a result and the Ministry may give you(teachers) either a certificate, additional scores, or a fee, whatever you call it, in return for your efforts. Maybe such programs need to be disseminated a bit.

It is argued that the need for a programme and framework can also facilitate the process for teachers in achieving the learning objectives. In other words, through these programs and frameworks educators can work their way up through the teaching processes to have children acquire the specified objectives. This aspect was well articulated by participants
Teacher_11 and Teacher_2.

Teacher_11: There are some things that need to be added to the programme or, you know, make it more comprehensive. But the danger is not to make it specific enough. Because when we talk about the curriculum, we have a lot of objectives in our curriculum. But it's not specific enough. It's very general. It's all over the curriculum. And there is no specific point like this climate education topic. So, when teachers are working on this topic, they have to go through the whole curriculum and look for objectives that they can check in order to work on the project.

One of the examples of such a framework was provided by Expert_1 as follows with reference to the fundamental components outlined in the features of the sections, and the conceptual confusion on climate education (see also: section 3.1).

Expert_1: There are things I strongly believe in.... First of all, giving teachers basic information about climate change education. Secondly, the issue of how to communicate with children about climate change and ecological crises. Thirdly, the inclusion of scientific information in the materials.... It is critical that children encounter scientific data and visual materials. Fourth, trying to create systems thinking as much as possible... Because there is a very serious confusion of concepts in climate change education, especially among children and adults.

However, Expert_8 suggests integrating the climate education program into the curriculum of every course, with clear goals, structure and learning objectives defined, instead of having it as a standalone program. This way, climate education can be integrated into the learning process, and it can ensure educators have a solid direction while navigating around the topic throughout the whole school year. This aspect is directly linked to and compatible with the expected features of the climate education curriculum discussed in section 3.3, however, the approach we see here is also critical in terms of establishing the relationship between programs and developing teacher competencies, which is one of the identified needs of the educator and will be detailed in the following subsection.

Expert_8: We need teachers to train them in order to see the opportunities that are offered by the students in terms of bringing the topic on the agenda. … I think that from the (perspective) of biology. When it's about photosynthesis or geography, when it's about erosion or the formation of landscapes and all these topics, maybe they are chances, opportunities for teachers to take it and not just knit a whole hour of teaching on climate change in it. But just regularly like a repetition… And I think that is something that's really important in climate education. Not just offering a package to teachers. Now you can teach for one week about climate change. How to recognize those little hooks that children bring into the classroom and how do you address it and where are the linkages? And that's about climate literacy for teachers.

3.6.2. Participants pointed out the insufficiency of adequate materials and equipment for climate education. However, one of the main reasons for this deficiency was associated with the lack of adequate climate education programs and frameworks.

Parallel to the lack of adequate and comprehensive programmes, participants also referred to the scarcity of relevant teaching and learning materials on climate education.
Teachers and experts point out that there are a few materials about climate education, but they are also very limited in terms of content, scope, and quantity. This limitation has been regarded as a drawback to the dissemination of climate education.

Teacher_7: I personally do (implementations regarding climate education) in class. For the moment, we don't really have courses, or we can't find so many resources yet.

Expert_1: Absolutely none. I could not find a single visual material that explains the carbon cycle, except for the limited things in the textbooks. Turkish resources are a big problem.... But there is really no publicly available resource designed by experts on climate change. There is a great need.

Experts and teachers from both Türkiye and Belgium commonly highlight the interconnected nature of curriculum and content, indicating that these aspects cannot be considered independently. The lack of adequate materials and resources for climate education was associated with the lack of programs and frameworks on climate education. It is argued that the need for a programme that establishes a framework for teachers to develop teaching and learning materials is essential. This aspect was well articulated by Teacher_2, while Teacher_6 provides an example for the functionality of its availability.

Teacher_2: For example, if someone asks me to develop content for this, I would say "Give me the objectives, then I will prepare the content.". Because how will I know what to do? You will give me objectives there. I will read the objectives... I am speaking on my own behalf here. I mean, if we say this in general, of course, we need to be specialised first. Or if what you are saying is to write something, it is also necessary to have experience in this. … I should receive training. If there is such a thing, I should also learn what I don't know. But after all, I know how to reach the knowledge... But as I said, if there is training, for example, what is being done more rapidly. Because people also have difficulties when they try to go back on their own. The expert in the field tells you, look, there is such a publication here, look, there is such a book and so on. Obviously, you are accelerating in this thing...

Teacher_6: We need a handbook with ready-to-use themes to give teachers ideas. Handbooks that are child-friendly, fun, and interesting. We need to stimulate children's curiosity. And above all, make them understand that they have an important role to play.

The field of climate education is a relatively new and rapidly evolving discipline. As a result, it is understood that a comprehensive program with a specific framework and objectives is imperative for developing further materials to address the scope and to have students reach the specified learning objectives and acquire the designated competencies. Therefore, it can be said that the development of a program and a framework for climate education must be the first step of the Clima-Kit Project before delving into developing teaching and learning materials.

Besides teaching and learning materials, participants also highlighted the inadequacy of equipment and having limited access to on-the-spot learning environments. The challenges within this scope include limitations in activities and implementations, as well as hindering teachers from conducting outdoor activities and fostering a connection between learners and nature.

Expert_2: There are some drawbacks. I think part of it has to do with the lack of equipment. In other words, the teacher wants to take the children outside, wants to bring them together with nature, wants to do outdoor training. But they cannot provide the children with different equipment, materials and tools to carry out this training. That is why they cannot practise in every season.

On the other hand, teachers and experts who are working in and with schools where climate and environment education was paid special attention, have created learning spaces in their school gardens or the natural places around them. While some of the participants provided many outdoor activities and learning activities involving various kinds of materials and equipment, some have referred to the limitations in this regard. Therefore, it can be said that those who are willing to implement activities find alternative ways to reach for equipment and learning environments depending on the capacity of the school circle or the expert's institutional circles. The Clima-Kit project can provide an approach for educators on how to make use of the present equipment and learning environments that educators can easily access to.

- **The complexity of climate education demands significant expertise, making material and content development more challenging for educators.**

The complex and interdisciplinary nature of climate change makes it challenging for educators to develop comprehensive educational resources. Climate education requires gathering and incorporating knowledge from various disciplines, environmental, life and social sciences in particular. Therefore, developing materials is regarded as a matter of competency for educators and a demanding task for teachers to cover the magnitude of the intricate and interconnected nature of the climate issue.

Expert_3: Unfortunately, it is never enough. Because it is not in line with other disciplines and does not form such a multidisciplinary structure, we see it (climate education) as part of such a big subject related to life sciences, while other courses continue in the same way. It is a part of the life sciences; the sciences come next, but since these are always in the form of units that coincide with the end of the semester, it is insufficient in that respect... There cannot be too much practice in this sense, but I think that the teachers' lack of resources and materials is a major obstacle. If he wants to do it and she gets the resources, this time the teacher has difficulties with the objectives he wants to achieve.

Teacher_12: We have the curriculum, but sometimes you have to find everything by yourself. So that's sometimes the problem that we're facing. We want to try a lot of things in several subjects, but we have to find out all the ways to do it.

On the other hand, a comparative perspective has been presented by Teacher_2, highlighting that while teachers possess competencies for such a comprehensive, complex, and interconnected issue, the lack of sufficient support for material development was found to be more significant.

Teacher_2: In general terms, of course, I have the knowledge, of course, I can prepare activities, but am I an expert? Because there may be many different details that I don't know. I mean, I don't know them, frankly. That's why I think an expert is an expert and you should leave it to the experts... It is an open question because I know all the details. I mean, I already know the basic things, but where does it go, where does it lead, are there completely different consequences that I don't know? I don't know those things.

In the following section, both the competency aspect and the lack of sufficient support for material development are presented.

3.6.3. Educators, especially teachers, lack sufficient content knowledge on climate education, therefore, developing the skills and competencies of educators is a crucial prerequisite.

When teachers working in or interested in the field were asked how competent they felt to teach climate change education, some expressed that they felt incompetent. Although some participants stated that they thought they had content knowledge, it was observed that they did not have sufficient content knowledge when they were asked to go into detail. This situation may be closely related to the complex structure of climate education mentioned in the previous section. During the interviews with the teachers, as in the case of Teacher_1, there are also those who think that they can identify the right content knowledge.

Teacher_4, on the other hand, defines this lack as a personal characteristic but clearly expresses the need to improve his/her content knowledge on climate education. The examples in this section include the participants' self-reports on their competence levels, and suggestions and tips on how to improve both teachers' and educators' competence on this topic.

Teacher_6: I don't feel competent when it comes to climate education. I haven't had enough training to teach it. There's very little training. I'd like to improve my skills in this subject.

Teacher_1: Basically, what I need is not really information. I can access the information in some way, but it should be structured, it should have an annual plan, or maybe I can think of some of the workshops I have attended before, and know what the outputs will be like. I can say I need a structured programme... Content written and created by experts and an annual plan would be much more useful.

Teacher_4: I never consider myself competent in anything. I mean, I always feel incomplete... There is one thing I am obsessed with at the moment. We have permaculture training, we are also a forest school. We have native seed exchange festivals... I want to improve myself in that respect, I feel incomplete. You know there are permaculture trainings... I know this academically and scientifically. My academic knowledge is good, but I feel lacking in how to apply it to daily life. I want to make a garden, "The insect in this garden is good, I should put this next to the tomato, if I put this next to that, it will help this or take that away"; there is such an ecosystem. There are trainings for that. I took action this summer to go to those trainings... So that I can give the future students the right information that I have received. I feel incompetent.

One of the main reasons for the lack of content knowledge was associated with the lack of sufficient information on the subject in pre-service teacher training. Strengthening these two pillars through the Clima-Kit project may also be a starting point for improving teachers' competence. While the first two examples below draw attention to the deficiencies related to pre-service teacher training, the last statement emphasises the need to make teachers and educators aware of the importance of the subject, without limiting the discussion to content knowledge.

Teacher_9: Maybe it would be interesting to spare a day to discuss how we can talk about climate change or what kind of activities we can do in the class. But we don't really learn how to teach it at school . So that's difficult.

Expert_7: My students now, I think everywhere in every teacher education, they now get it (content knowledge about climate education) properly. But there is a big gap between the teachers that didn't get the education. … I was in an Erasmus program in Norway and they actually said the same thing. We see more students go to university, and the level of our new students is getting lower. … So the biggest problem was to educate the teachers who had to do the program. I heard things like we have a hole in the ozone atmosphere and that's why it gets warmer.

Expert_3: Because none of us actually went through this training in pre-service training in colleges. These are not the things that have been taught in our faculties of education until this year. The things that we have seen were in the context of science education... (It is necessary) to create areas that allow each of us to gain this awareness. I think teachers need to raise their own awareness first, so that they can internalise it, adopt it and make it their priority.

In this context, Expert_2 elaborated on an example that they implemented as good practice with teacher candidates and trainers as follows:

Expert_2: In the meantime, while I was doing this work, I opened up this area of experience to volunteers who wanted to work with children as much as possible, or who were preparing to work with children, studying pre-school education, studying pedagogy. I trained them first about what to look out for, what kind of context will it be? I even shared the practices with them.

On the other hand, some participants stated that educators are competent in terms of knowledge and experience, but that teaching processes can be made more qualified by supporting them on this matter. In addition, it was emphasised that providing material support would also increase the quality of education and training processes. Within this context, the outputs of the Clima-Kit projects may address these needs.

Teacher_11: I think they are competent enough, yes. But I am doubting if they have the right materials and the right resources like you said. I think it could be my duty (as a principal), my function to help them towards these resources. And I think this project can be perfect for that.

Teacher_12: I think it's okay. But I think when I receive some special training about that, it would be useful. It will be useful, to teach more, to know more ways to educate the kids. But I didn't receive any, maybe some special training about it would be interesting…. Maybe some books or maybe the special training of someone who could explain the subjects to us in detail. And that will be easy. Some books, maybe some websites which could be useful. And some videos.

3.6.4. Regardless of the competency levels of educators, participants argue that there is inadequate or minimal support for the professional development of teachers.

Climate education is a newly emerging topic, yet it has not secured a central position on the agendas of education systems despite its global imminence. Teachers are not well prepared for climate education during their pre-service training. With this in mind, ministries of education may be expected to provide support for teachers. However, when the participants were asked whether they have support from the local and national education authorities, they revealed that there is no sufficient support or adequate in-service training for teachers.

Expert_3: I see that the Ministry is taking some steps here (about materials). In pre-service education, books and topics are now included in summer programs, yes, but in a time when we are in an online environment far from reality, it is much more natural, beautiful and impressive to talk about these issues face-to-face. I still find it insufficient. There are steps but we are moving very slowly.

Teacher_4: To be honest, I have not received this kind of support from the ministry. Even in the cooperation agreements and protocols we have signed with the municipalities, (there are problems) with the units opened for the climate crisis. We have managed to raise awareness in our school. We care about CO2 emissions. We create awareness... We have done it with interviews and articles. But I haven't received any training from the ministry yet, so I have my own troubles. Unfortunately, I have not received any training from the ministry.

At this point, support of schools and school communities including parents becomes more significant and meaningful to encourage educators to endure their efforts on teaching climate education. While Expert_7 portrays how school administration takes the initiative in this matter, Teacher_4 emphasises the role and contribution of both schools and parents.

Expert_7: And does the Ministry of Education support teachers in that terms? No. No. School, maybe. School administrations? They do it. But they have some major subjects for each year. For instance, now, in the school of my children, it's the implementation of more computers. So now this is the main subject. But you definitely have schools where then sustainability or climate education is one and then they help. But it's always, it depends, like you say, on the administration of the school, what they choose.

Teacher_4: First of all, as I said, the support of the school administration is very important. If we think financially, if we think morally, the support of our families at home is very important. Because our expectation for every activity and project that we do is to involve the people around them; first of all their family, their neighbours, their friends in their neighbourhood and even the local authorities in this work, while our students transform these learning activities into behaviours in themselves.

Another important aspect was indicated to be peer-learning and forming learning communities in schools and among educators. Expert_2, while not directly focused on climate change, noted their significant contributions in generating impactful content related to sustainability and nature education. Participants highlighted their involvement in collaborative efforts with teachers through peer learning initiatives and shared examples of good practices in promoting a common vision and coordinated efforts.

Expert_2: There are responsibilities for policymakers at the urban level. In particular, we are revisiting issues such as the scarcity and poor quality of public spaces, or the fact that natural areas are generally considered as material resources at the urban scale. I have worked extensively with teachers to address these issues. We discussed how to integrate the curriculum of preschool education programmes into the framework of education for sustainability, how to write the programmes, how to connect with the family, how to structure the activities from the perspective of the institution and the neighbourhood they are in by connecting with the community. We gave them good examples, held meetings with academics and prepared different curricula.

Although with reference to citizenship education, Expert_8 elaborated on how learning communities support and encourage teachers while also providing a space for exchanging experiences and sharing practical information for the teaching and learning processes. *Teacher_3, on the other hand, explains the importance of learning communities to tackle infopollution and meet the needs in terms of content knowledge.*

Expert_8: If you mentioned the learning communities that schools are grouped in clusters and often they form learning communities. And there's also a lot of learning to be done among the teachers that are already in practice… Then the learning communities. They are just communities of teachers that are sharing their expertise. And I think that could be a very powerful method because we are now engaging in a project with schools. That is gathering teachers for citizenship education and how to do it. And they will be the teachers in this group. Making lessons together and there will be coaching for them in order to do so… I think it's a great opportunity for teachers that are already teaching to learn and to invent, to address the questions they have... I think that is also very powerful.

Teacher_3: It would be very useful to exchange ideas. It would be possible to get feedback from our teachers in other fields and maybe also from the community. Therefore, these exchanges of ideas will also expand our perspectives. In this way, we can see more clearly the possibilities, or the impossibilities and we can carry out our work better. As you said, if we can have more information about dozens of platforms that we can use inside and outside the classroom, if we can include them in our lessons, we can create additional opportunities for our children to learn about them outside the classroom.

Contrary to the previous arguments, some of the participants set teacher engagement and devotion above these other factors including needs for support in terms of program, framework, materials, teacher competency and institutional support. In specific subjects, such as climate education, it is assumed that the process depends on the awareness of the teacher, thus leaving most of the responsibility to the teacher. The main argument in this context, from a relatively idealistic perspective, is that the principal and the teacher should be inquisitive, have a desire to research and have an investigative attitude towards what can be included in the learning process, without being limited to what they have. This dimension was also associated with the need to develop more materials to facilitate the teacher's teaching processes, as mentioned above, and at the same time, it was emphasised that educators should access these materials with a researcher's attitude. When these two dimensions are taken into account together, it becomes apparent why there is a need for initiative-based dissemination of climate education, as previously discussed in section 3.2.1. In this context, the Clima-Kit project can be useful in raising teachers' awareness and in guiding teachers towards observational work, while supporting teachers with some frameworks and guidelines and proposing a balanced approach without leaving them with all the responsibility.

Expert_2 highlights the key role of teachers in improving, and developing the learning processes as leaders, while Expert_8 overwhelming aspects of this responsibility inflicted solely on them.

Expert 2: I think the most important thing is the lack of qualified adults. In other words, the more qualified adults the teacher (finds) in his/her organisation, the more he/she will be able to overcome the obstacles in front of his/her initiative. There are teachers who overcome obstacles. I know teachers who are working on this issue and there are even teachers who are working in the public schools. They can initiate this change in their own schools. They can get support from parents; they can organise free practices at weekends. They can organise forest meetings with children. These are really very remarkable and valuable, but they are very rare.

Expert_8: There are so many sources in Flanders that mention that teachers are under a lot of pressure. They are not only in terms of planning and administration. They have to deal with a lot of things like the diversity of their classroom. They need to be very adaptable. They need to be very flexible. And they also need to fill in a lot of papers. There's a lot of administration because they need to follow up with a lot of individual pupils… There are a lot of small actions going on, but that's not really climate education. They are really making efforts to like, for instance, stimulating going by bike to school or not using, uh, packed biscuits or things, you know, to eat. But that has more to do with the environment and climate change. So, these small actions do reflect the fact that they are aware of the relevance of it. But that doesn't mean that it's reflected into their daily lessons.

To consolidate the peer-learning and form an endurable learning community, participants have suggested establishing a common platform that all educators and stakeholders in climate and environmental education take part in and benefit from. Expert_6 pointed out that the members of such a learning community can contribute to the platform with materials and learning activities to spread good examples and practical tools. Expert_4 highlights the importance of the Clima-Kit project in terms of establishing a platform that can address the need for an inventory. Expert_7 suggested different kinds of resources that can be helpful for educators during their teaching processes.

Expert_6: Some schools know about it, some don't. But we have a website. It's a website where every organisation or teacher can put stuff on. And then if you type in a topic, you get lessons for example. And a lot of the lessons from those organisations are in this system. So maybe they don't know them directly, but the system is known very well with teachers. So, if they teach it in climates, they will get a lot of activities from those organisations. So that's maybe I don't think they know the organisation, but they can reach out to the topics easily.

Expert_4: Probably not. There is probably not enough material. And if there is, it hasn't been organised. So, it may not be available yet. But those who look for it will find it. I mean, it's out there somehow. ... I understand that you (this project) are already aiming for that. I mean, I think it will be a platform. So now I can suggest that instead of an inventory study to collect what is available, you should try to make the programmes that have been developed accessible. For example, just a year ago I looked at the process of climate change in the world from beginning to end (there is no narrative resource) ... The most basic information like what happened after the Kyoto Protocol was missing. Maybe it's available now, but I couldn't find it 2 years ago.

Expert_7: When you have a program for children, you will need to provide a background for the teachers as well, so that they know a little bit more and feel confident about giving the program to students. Offer some tips or provide some links to helpful websites that they don't have to Google themselves; you've already googled them for them. And ensure that they can just click on some links. This way, we can find some more information about the topic when I really present my students with the content.

Other participants also put a great emphasis on providing small-scale teacher training and modules for educators that can take part in the common platform for climate education. Expert_8 explains the scope of the resources to be provided and to what extent teachers can be guided through them as follows:

Expert_8: It's also interesting when you initiate a program that you provide some kind of webinar, like online training for the teacher. How am I going to use this material? And what I think is also a criterion for digital content or a digital program is always availability. It's very flexible, but if you make it very rigid, then it loses its flexibility. I mean, rigid in the sense that you have to go through all these materials chronologically. You cannot go to that before you have finished one, two, three. That is not very accessible, inspiring, or motivating for teachers who are under a lot of time pressure. So, I think one of the criteria should also be accessibility. In a way, I can explore all the things available, and I can choose which material or module section I want to work on because you might present something on a topic that the teacher is very aware of or has already worked on with the children. (Educators should be able to say) "But that topic, I haven't done this yet. This is very inspiring. I want to do that, but I do not want to go through all these topics before I am able to reach that module.".

- **The need for establishing learning communities and common platforms indicates the need for well-curated resources.**

Within this context, teachers and experts were also asked about the resources they use when teaching about climate education or implementing climate-related activities. Teachers, educators, and experts rely on various resources for climate education, including international resources, academic reports, and scientific articles. They also put a great emphasis on how they consult each other and why peer-learning is a practical option since personal experiences play a significant role in enriching climate education content, developing and improving teaching and learning materials that can provide meaningful understanding of climate education for both educators and students. Access to reliable and up-to-date information about climate change was found crucial by the participants. Therefore, they often utilise the knowledge, know-how, and expertise of NGOs. However, during the interview, they also stated that websites on climate education, news, magazines, TV, and newspapers are also daily sources of information. However, no expert or teacher was able to name a direct source of content that could be used in school. This suggests that people working in this field have to constantly put different resources together.

Interdisciplinary approaches and collaborations with experts from different fields contribute to the development of comprehensive climate education programs. The availability of open-access and user-friendly platforms for educational materials was found to be essential to ensure that all educators can easily access and utilise the resources for effective climate education which is compatible with the insights of the previous subsection on the significance of establishing learning platforms. For the Clima-Kit Project, it is recommended to provide a beneficial resources section on the online platform apart from the content to be developed within the scope of the project.

3.6.5. Implementation of time-intensive curricula restricts teachers' capacity to allocate sufficient time and attention to climate education.

Educators are facing some fundamental limitations when it comes to teaching subjects that are not integrated into the curricula. Many educational institutions and teachers feel obliged to focus on the core subjects, leaving limited room for incorporating “extra-curricular” topics such as climate education into the teaching process. Under the heavy workloads of the present curriculum, teachers often neglect emerging topics like climate education and they cannot allocate enough time to climate education which is a common issue both in Türkiye and Belgium as explained by Teacher_3 and Teacher_7.

Teacher_3: Our lesson time is 40 minutes and we have one lesson per week. I have about 22 or 23 hours with each class. I have one hour at each grade level.

Teacher_7: Well, as I already said, currently I'm not doing enough. One of the problems is and that's also an answer to the second question, that we don't have so much time in our curriculum.

This constraint is also directly associated with the expectations regarding academic achievement and constraints put forward due to the high-stakes exams and standardised testing traditions.

Teacher_2: Let me say it precisely, I mean, of course, there are teachers who care about it and elaborate on it, but in the end, we have exam stress. There is an exam (on a national level) or a written exam at the end of the year. Parents are also expecting (academic achievement). In other words, the grades on the exam are more important than... describing a natural phenomenon here.

Expert_8: Because mathematics (scores) are going down, language (scores) are going down. So, there's a panic, there's a lot of pressure. It's just a thought but now maybe climate education and all the education for sustainability in general should be more integrated in all subjects, in mathematics and geography and everything.

When examining this aspect within the context of the Clima-Kit project, it becomes evident that the significance attributed to climate education, as elucidated in section 3.1, should be translated into initiatives fostering widespread public awareness. Furthermore, efforts should be directed toward elucidating the pertinence of the subject within formal educational frameworks and elucidating the imperative of climate literacy for students. At this point, it is recommended that the Clima-Kit project should carry out as much information and dissemination work as possible before the publication of the programme, content and material and take steps in this context.

3.7. Climate Education & Students

In line with the interviews conducted with the students, it is possible to say that the children are aware of climate change, at least all the students are familiar with the concept. The results of the student interviews were analysed under three main categories that are the students' level of knowledge about climate change, the students' experience of climate education in their daily lives, and the students' feelings and thoughts about climate change. These categories are described in more detail below.

3.7.1. Students' levels of knowledge about climate change vary and this makes it difficult to draw general conclusions about students.

The most notable difference in the children's interviews was their awareness of the concept of climate change and the causes and consequences of climate change depending on the country. Students were first presented with five statements and asked to express their opinions on whether the statements were consequences of climate change. The first statement presented as a consequence of climate change was the rise in sea levels. Student_3, Student_4 and Student_5 answered this question correctly, but Student_1 and Student_2 stated that they had no information on this subject. All students answered the second and third statements correctly: Extreme weather events and droughts are a consequence of climate change. The fourth statement was that the longer lengths of days are not a consequence of climate change. All students except Student_3 answered this correctly.

Students were also asked whether the statement "Today, climate change is caused by human activities such as burning fossil fuels and cutting down forests." is true or not. All students answered this correctly. Although three students could not explain why, two students were able to give an additional explanation about why the statement was true.

Finally, the students were shown a photograph of a wind turbine and asked what it is and what it is for. Student_1, Student_3, Student_5 stated that they did not know what was in the photograph. Student_2 answered this question as "To know when there is wind. When they turn, there is wind." However, with the additional note from the interviewer, the student remembered that wind turbines are for generating electricity. The student who gave the clearest explanation summarised it as follows:

Student_4: This protects climate change. Fossil fuels cause damage, but wind energy does not cause any damage and we generate energy from the wind.

Looking at the students' answers to the questions about their level of knowledge as a whole, it can be said that the students have some correct knowledge about climate change, but they also have relatively unclear knowledge.

3.7.2. Students' educational experiences of climate change are diverse.

Students' experiences of climate change in their school or daily lives vary. There is a significant difference in the answers given by students according to their country of residence. In Belgium, both students surveyed generally answered negatively when asked whether they discuss climate change with their teachers or friends at school. However, on further questioning, it becomes clear that climate change is indeed a topic that is occasionally discussed in their schools.

Student_2: We made a car that can run on electricity, that is renewable energy, you can charge the batteries.

Student_1: Activities such as a nature outing in a park or forest, bird watching, etc. Yes, we went to the forest to work around a big pond. We removed little trees growing around the pond, so it got lighter, and we made a pile of branches.

Examples like these might suggest that students are involved in activities at their schools that could be linked to climate education, but it's possible that they don't immediately associate these activities with climate education in their own perceptions.

Conversely, it's worth noting that issues concerning climate change are actively on the minds of students in Belgium in their daily lives. Both students mentioned that this topic is a common subject of discussion outside of school, particularly within their households. It can be observed that when there are events or situations attributed to climate change, it often becomes a topic of discussion in the news.

Student_2: If it comes on the news, yes, with mom for example we talk about it if something has been in the news such as the floods in the Ardennes.

When conducting interviews with students in Türkiye, it was discovered that they have engaged in a variety of climate-related activities. These examples align with the statements made by teachers at the same school. One notable aspect that emerges from the student interviews is their ability to establish clear connections between the activities they participate in at school and the issue of climate change. Furthermore, these interviews indicate that climate change-related activities are not limited to science classes but are also conducted in non-science subjects and extracurricular school events, such as science festivals.

Student_4: This is a general topic at school. We study and talk about the environment and how to find a solution to it, how to protect ourselves from it and how to warn people and try to make them more aware of it.... Yes, it is opening up because I think this is a very big problem. As I mentioned before, we can think of it as agriculture, trees, almost all the nutrients, all our needs are going away, and they are... For example, in the visual arts class, we were collecting leaves and trying to make a painting with them. But we learned to make things with the leaves that fall on the ground.

Student_5: Yes, usually with Teacher X (s/he gives the name of a teacher), we talk a lot about these issues with Teacher X. Not only with Teacher X. We talk a lot about these issues with all the teachers... And our school is very sensitive about this issue, there is new information every week about this issue. Our school raises awareness of its students on this issue.

Student_3: In science, we talked about it, and then in a private programme, we did a lot of experiments about it. At the moment, we are doing topics and solving questions about it... For example, there was a science festival. We had a lot of experiments about global warming.

Although a difference between countries is mentioned under this heading, it should be kept in mind that these are the findings of interviews with a very small number of students from one school in each country. In addition, as explained in detail under 3.3.10, it may also be due to the socio-economic differences in the regions where the two schools are located.

3.7.3. Although the students' thoughts on climate change are similar, it can be seen that they have very different feelings about it.

All the students interviewed have a common conclusion that climate change is an unwanted situation. However, when their feelings about climate change are analysed, different statements are observed. For example, one of the students defined his feelings about climate change as fear.

Student_1: I am afraid that people will not survive so many floods, fires, etc. I think it will happen to me too because I see how it happens in other countries. I am also afraid that there will be war due to climate change because people will have to flee.

The expression used by another student while expressing his/her feelings about climate change was an embarrassment and it is said that this embarrassment is caused by other people's behaviours towards nature.

Student_3: I'm ashamed of people and myself, to be honest. Yes, you know. I mean, it makes me sad that people continue to do these things and they don't take these kinds of projects seriously at all. I always apologise (from nature).

A student who stated that he felt bad about climate change explained the potential consequences of the process in detail with the following statements.

Student_4: I've been feeling bad about climate change lately because I think climate change is a bad thing, because carbon dioxide gases are constantly forming air. It forms a layer above. There is heat. There is drought. When there is drought, glaciers melt, forest fires occur. Agricultural regions are lost this time, they become unproductive. So, something bad happens.

Another student articulates a sense of empathy towards people suffering from the effects of climate change, as he does not personally experience the effects of climate change in his own life. This can also be interpreted as an illustration of the climate injustice discussed in section 3.3.10.

Student_1: I feel sorry for the people, but not for myself, because I have never experienced a flood, for example. I do think it will be fine.

PART 4

RECOMMENDATIONS AND HIGHLIGHTS OF THE NEEDS ASSESSMENT RESEARCH

This section presents the findings and highlights of the needs assessment research conducted for the Clima-Kit project. The data and findings from this research are provided in a comprehensive manner with the aim of providing guidance not only for the Clima-Kit project but also for future initiatives.

1. Experts and teachers mentioned that the curriculum in Belgium is undergoing significant revisions. However, no specific information on the extent of these curriculum changes was obtained during the interviews. As the new curriculum is to be implemented in the upcoming school year, it would be beneficial to conduct a thorough research and detailed analysis of its scope.

2. Climate education is conceptually close to sustainability and nature education, which may lead to potential conceptual ambiguities. Therefore, it is imperative for the project to establish a well-defined conceptual framework for climate education. This framework should clarify the points of intersection with related concepts and provide clear boundaries to define their respective domains.

3. It is considered important to provide teachers with additional resources that will enable them to enrich their content knowledge about climate change.

4. Several projects with a focus on climate education and neighbouring concepts were mentioned. Very few project names were provided, although this was specifically asked for. The creation of a central repository of these studies would serve as a valuable resource for beneficiaries and facilitate the dissemination of climate education. This, as mentioned above, provides ideas for new projects that can be realised after the Clima-Kit project.

5. There is a general consensus among experts and teachers that climate education content should not only be included in specific courses such as science or life sciences, but should be supported by an interdisciplinary approach and, from time to time, by extra-curricular and/or out-of-school practices. However, there is no clear recommendation on how this should be structured. There are also opinions that climate education should be implemented within a school culture. In this context, it is possible to explore and test various alternatives regarding the incorporation of Clima-Kit project content into specific courses or school hours. It may be preferable to disseminate the most effective of these alternatives in future studies.

6. It has been noted that the lack of a comprehensive and well-defined curriculum for climate education poses significant challenges for teachers. Nevertheless, experts advocate a more holistic approach to climate education, as opposed to a stand-alone curriculum. In this regard, it is considered crucial to provide schools and educators with a conceptual framework to serve as a guiding structure, rather than a rigid curriculum proposal. This framework can be developed and applied within the project.

7. It is seen that the ministries of education of both countries have projects on climate education. In Türkiye, a commission continues working in this regard. It is recommended that the efforts of these commissions should be investigated in detail in order to ensure the sustainability of the project.

8. The emphasis on the importance of climate education and the lack of projects at a level to respond to the need in this field is a common issue among experts and teachers. It is seen that the project responds to this need.

9. Experts and teachers agree that hands-on science education (experiment-based education) is critical for students' learning. However, there was a notable emphasis on integrating various teaching methods into the educational process.

10. In the field of climate education, particularly at the primary school level, experts and teachers mainly emphasised recommendations aimed at promoting children's awareness of and positive attitudes towards nature. The need to adapt the content to the age of the students and to show sensitivity in this regard was repeatedly emphasised in initiatives at the primary school level. This aspect should be considered as a priority both in the development of project implementations and in the evaluation of their effectiveness.

11. It was repeatedly emphasised that climate education should be based on basic knowledge and concepts but should also be geared towards the development of skills and the acquisition of competencies, with an emphasis on encouraging children's participation. The efforts within the current project are anticipated to be focused on developing practical skills. It may be beneficial to include additional activities specifically designed to support children's participation. In addition, the existing project could be complemented by future initiatives specifically aimed at increasing child participation.

12. There is a clear need to expand teachers' competencies in both climate change (content knowledge) and climate education (pedagogical content knowledge). In this context, one of the methods proposed by both teachers and experts is the establishment of teacher communities to facilitate mutual learning and support. This could be regarded as a subject for assessment in future projects.

13. There are noticeable socio-cultural differences between the students of the two schools in the respective countries where the project will be implemented. This could be an area of particular emphasis in the development of the content of the project as well as in the evaluation of its effectiveness.

14. Both teachers and experts agreed on the importance of integrating digital content into the teaching process as a means of improving student learning. However, it was pointed out that both digital and face-to-face teaching have certain limitations. In light of these considerations, it was suggested to prioritise different teaching methods, possibly opting for hybrid approaches, while emphasising the value of enriching the learning experience with digital content. It is believed that including digital implementations for students as part of the project will increase its impact.

15. One evident outcome is that teachers possess limited competencies when it comes to delivering hands-on science education in the field of climate education. In this context, the fact that the project will also address this need demonstrates the urgency of the project.

16. Teachers expressed that they didn't perceive a strong sense of eco-anxiety among their students. Experts, on the other hand, were more concerned about this issue. The reason why teachers do not encounter such situations can be attributed to the limited emphasis on climate education in their teaching practice. In addition, teachers may not feel adequately equipped to provide guidance when faced with such situations. To address this, it is advisable to include additional tips and guidance for teachers on how to deal with such specific situations within the programme content.

17. As in many other disciplines, it was observed that teachers have concerns about their workload in the school and in terms of the curricula. It is crucial to carefully plan the Clima-Kit contents and any supplementary activities, considering these concerns.

18. While the interviews with students indicate a level of awareness about climate education, it's important to note that making a comprehensive judgement solely based on these interviews may be limited. The findings regarding students' knowledge, skills, and competency levels on this matter, as outlined in the report, should be assessed in conjunction with this limitation.

CLIMA-KIT

CLIMATE EDUCATION with HANDS-ON SCIENCE at SCHOOL

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