

Article

Climate Youth Activism Initiatives: Motivations and Aims, and the Potential to Integrate Climate Activism into ESD and Transformative Learning

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Abstract: For about two years, the climate youth activism initiative Fridays for Future has addressed climate emergency, receiving considerable attention because of their consistent protests every week in many different locations worldwide. Based on empirical studies in Austria and Portugal, this paper investigates the motivations of students to participate in the movement and the solutions proposed by young activists to fight against climate emergency. Moreover, we discuss the integration of climate change activism into ESD (education for sustainable development) and transformative learning processes, and how this enables environmental citizenship. The results of the studies reveal that emotions and feelings of solidarity and collective aims are motives to participate in the strikes. The young activists sometimes propose innovative and sometimes radical solutions to climate emergency. Both demonstrations and exhibitions as forms of bottom-up climate activism initiatives contribute to engagement in political dialogue and scientific knowledge transfer. They can be seen as “triggers of change” for transformative learning.

Keywords: climate activism; Fridays for Future; Education for Sustainable Development (ESD); transformative learning; Environmental Citizenship (EC); shift in consciousness

1. Introduction

Greta Thunberg has told world leaders at Davos Economic Forum in 2019: “I don’t want you to be hopeful, I want you to panic.” [1]. The young Swedish activist has initiated a students’ movement, arguing that climate emergency does not allow for further delays: political leaders should take radical social-ecological transformation measures. Climate protests of the Fridays for Future (FFF) movement, which started in late 2018, have been the largest in history and did not seem as if they would stop until the COVID-19 pandemic [2]. The young activists of FFF received attention because of their consistent protests every week in many different locations. At the strikes on 20 and 27 September 2019, more than 3 million people were reported to have participated in the strikes, which took place in more than 150 countries [3]. These young activists also received attention because of their age and their speeches, which embarrassed political and economic leaders. In order to understand the specific experiences and knowledge that teachers can incorporate into their classrooms, we analyze climate activists’ statements, ideas and proposals through three different case studies from Austria and Portugal. With these empirical studies, we discuss

students' motivations and the schools' possibilities of integrating climate change activism into transformative learning processes.

Considered as "an inescapable dimension of social life" [4] (p. 84), identity plays a key role in driving the climate movements, online and on the street, as argued by Doolen [2]. Participation is therefore about taking part in a social process [2,5]; it shapes the identity of the protestors. Berezin [4] highlights that identity is "central to participation in meaningful patterns of social and political action" (p. 84). In fact, social relationships can be seen as the base where one practices democratic principles (through cooperation and participative activities), developing a common identity that sustains democratic thinking [6]. Participants became familiar with climate demonstrations, and the need to feel comfortable decreased once the strikes became known as normal and inclusive. Emotions and feelings such as frustration, powerless, but also hope and trust, offer some insights into the affective reasons to mobilize [7,8], and the role of affective bonds in motivating participation [9,10].

Civic engagement and mobilization thus depend on confidence in the effectiveness of participation, and beliefs about one's own capacity to become actively involved [11]. Active involvement as an agent of change is strongly associated with the exercise of environmental citizenship [12,13], and climate awareness seems to be a major reason to participate in the movement that requests the fulfilment of the Paris agreement and an education for sustainable development (ESD) with a critical approach.

We argue in this paper that youth activism such as FFF enhances self-confidence and act as agents of change and transformative learning processes promoted by various engaged authors [14–16]. Transformative learning implies changing the identity of students in a way that students share their experiences and identify new ideas and solutions for sustainable futures. Therefore, this paper discusses two main research questions: (a) What are the motivations of students to participate in climate youth activism initiatives, namely Fridays for Future? (b) What solutions to the climate crisis do secondary school students and climate activists have? Based on findings of these two RQs in Austria and Portugal, we then discuss how the integration of climate activism into ESD (Education for Sustainable Development) and transformative learning can promote environmental citizenship. We first briefly describe the history of the FFF movement and discuss the concepts of climate activism, environmental justice, and transformative learning. The results from empirical studies in secondary schools and with young climate activists in Graz (Austria), Lisbon and Porto (Portugal) will be illustrated and analyzed in the frame of activism approaches, ESD and environmental citizenship, and transformative learning processes. We finish the paper with a conclusion on the contribution of climate activism to environmental awareness raising and citizenship, and with some recommendations on the integration of activism into formal education.

2. Theoretical Background

2.1. Climate Activism: From School to the Streets

Regular climate demonstrations lead to an increasing awareness of environmental damages and climate changes. Despite the COVID-19 pandemic, the Fridays for Future movement continues to strike, though with a lower number of participants. The movement that has been initiated by Thunberg striking in front of the Swedish parliament to claim the application of the Paris agreement can be partly explained by a long tradition of care for nature, outdoor education and ESD in Sweden [17] promoting the "greening" of schooling and resulting in a more eco-centric educational approach. Subsequently, the Swedish green school movement implemented award systems such as the Green Flag. Green topics and issues were first introduced in formal and informal education by individual teachers and organizations [18]. Although such environmental activities and eco-labels foster environmental action and citizenship, measures and actions are based on a top-down approach set up by politicians and public authorities. Reading this assumption through Biesta's [19] lens on democracy, we ought to state that these policies mean "nothing more than bringing more people into the existing democratic order" (p.28). This contrasts with

the concept of democracy and politics that is to be found “in the interruption of the order in the name of equality” (idem, p.26). Thus, as claimed by different FFF activists, one needs to open themselves to a more horizontal way of making politics (and not policies). Climate demonstrations are of this example: they were initiated by students, through a bottom-up approach, which explains why participants can more easily identify with the actions taking place. The feeling of being part of a “family” enhances identification with claims and aims of the movement and, as research with adolescents confirms, influences the sense of community, which is an important predictor of social and civic engagement and participation and, therefore, positively related to youth citizenship [20,21].

FFF activists are mostly in privileged situations, and many of them are conscious of their social status. As for counter-cultural movements, FFF is sometimes accused of being a white, middle-class youth movement [22], encompassing the “rejection of the values of capitalism . . . [aiming to] supplant it with a new series of values relating to sustainability—social, economic and environmental [23] (p. 4). This accusation “has achieved the status of a common-sense assumption even for social movement specialists” [24] (p. 164), but it represents an “inherently narrow interpretation” [23] (p. 6), which does not mean that the movement should not “develop [in] a more inclusive, culturally sensitive, broad-based environmental agenda” [25] (p. 16). The removal of a Ugandan woman, Vanessa Nakate, from a photo featuring prominent climate activists including Thunberg, Tille, Neubauer and Axelsson at the Davos Economic Forum 2020 by the Associated Press, a US news agency, led to global outrage in various media. FFF demonstrations are taking place in many different countries in the world, and the movement also engages in questions on social justice. However, in Austria for example, children from schools in social flashpoints and from working classes are less involved in the movement [26].

The movement is regularly present in social media where demonstrations are organized. FFF has been very influential globally and been recognized by national governments and supranational bodies such as the United Nations (e.g., Environment and Development Programs) and the World Economic Forum. Therefore, the movement gained power by obtaining the opportunity to speak at the UN Climate Change Conference and other international meetings. While FFF leaders such as Thunberg and Neubauer discuss with politicians and scientists, the activism of the FFF base can be encouraged and supported by schools. Schulz et al. [11] and Pancer [27], Reis [13] explain that open school climates, democratic structures within schools and early opportunities for active participation can foster students’ civic engagement.

Activism makes a major contribution to environmental citizenship but is sometimes seen as a problematic concept because it is often associated with radical and, on occasion, violent demonstrations and actions where protestors and the police clash [13,28]. However, in this paper—and according to the representation of climate movements such as FFF—activism refers to a collective, democratic and research-informed action. The FFF movement represents a wide range of viewpoints and opinions, and is characterized by ideological divides and tensions between moderate demands and more radical claims [29]. Nevertheless, FFF articulates a strong aim for political neutrality across ideological boundaries [30], as Marquardt argues in a paper analysing moderate and radical ideas and media representation of the movement [29].

2.2. Emotions and Motivations

Emotions play an important role for civic engagement and for (climate) activism. They are a driver and trigger for mobilization on the group and the individual level. Younger students do not have voting rights yet so that they can feel powerless. Protests thus are a vehicle to share thoughts, express opinion and claim political involvement. De Moor et al. [7] who analyzed survey data on the FFF protest participants in 19 cities around the world on 15 March and 27 September 2019, highlight affective reasons to mobilize, in particular the feeling of being worried and frustrated concerning global warming. However, the activists also declared their intent to be hopeful about the ability of

policies to address climate change. The Austrian FFF activists announced in 2019 their aims, including six key claims to be addressed to the Austrian national government (Table 1).

Emotions are also important for intrinsic motivation. According to Ryan and Deci [31], people whose motivations are authentic have more interest, excitement and confidence compared to those who are merely externally controlled. They show enhanced performance and creativity. As climate youth movements such as FFF are bottom-up initiatives, the young activists generally show a greater self-motivation. Cognitive evaluation theory, a subtheory within the self-determination theory, defines factors that foster intrinsic motivation [31]. The theory argues that feelings of competence and positive performance feedback enhance intrinsic motivation, curiosity and desire for challenge. While tangible rewards, threats, deadlines and pressured evaluations diminish intrinsic motivation, choice, feelings of autonomy and opportunities for self-direction increase it. In contrast to intrinsic motivation that refers to doing an activity for the inherent satisfaction, extrinsic motivation refers to the performance of an activity in order to attain some separable outcome [31] (p. 71).

Table 1. Claims of the Austrian FFF movement [32].

FFF Claims	
1	Implementation of climate and ecological emergency measures
2	Linear reduction of greenhouse gas emissions by 2025 to 50% compared to 2005, and to net zero by 2030
3	Anchoring of climate protection in the constitution and the withdrawal from oil, coal and gas by 2030
4	Eco-social tax reform from the year 2020
5	Measures to promote biodiversity
6	Stop major fossil fuel projects, such as the construction and expansion of airports and freeways

2.3. Climate Activism: Exhibitions

One form of collective and research-based activist activities are exhibitions that are based on the concept of interactivity. In this paper, we draw on exhibitions, which were developed by Portuguese students aimed at involving the community and the school in the discussion and reflection on socio-scientific issues. The exhibitions should foster the adoption of behaviors contributing to a more sustainable future [13,33]. In order to promote the understanding of complex issues and the development of decision-making competences, they can present the perspectives of different social stakeholders regarding various issues and ask visitors to question the social, economic, political and ethical impacts of scientific and technological proposals in their daily life [34]. In this way, visitors can actively develop their own critical perspectives and feel challenged to participate in collective action [35–38]. The concept of interactivity requires interaction between the visitors within the exhibition and between the visitors and the objects that are being exhibited [39,40]; an interaction that exists even if the visitor is only thinking and reflecting on the stimulus from the object, not requiring any physical movement [41,42]. Several studies have suggested guidelines on how to develop socio-scientific based exhibitions, such as presenting an interesting narrative in order to raise visitors' curiosity and challenge and stimulate their participation [43–46].

Rodari and Merzagora [34] highlight that museums can be presented as “social venues open to debate, where citizens' concerns are taken into account” (p. 2). In an empirical study, Bandelli and Konijn [35] analyse the visitors' interest in the Science Museum in London according to three levels of participation: sharing opinions and feedback, co-developing programs and activities; and participating in the governance of the museum. Therefore, we think that (scientific) exhibitions can foster debates and exchange on climate

change and other scientific issues, and even promote the co-development of new ideas and activities, and the concept of interactivity.

2.4. Environmental Justice

Climate movements often refer to the term environmental justice. As Kopnina [47] notes, the notion of justice is “fundamentally concerned with equalizing relations between those who have power and those who do not” (p. 291). Young climate activists—who often are not enfranchised yet, because they are too young—claim an intergenerational justice. They have to live with the impacts of the climate crisis and, thus, raise their voices for justice. The radical environmental justice framework focuses on three core elements: distributive justice, recognition and procedural justice [48–50]. Later, capabilities have been added as a fourth element to environmental justice [51]. The first element, distributive justice, deals with unjust distribution of costs and benefits following environmental interventions. Several distributive justice principles exist, including the dimensions of vulnerability, need and responsibility [52]. Vulnerability implies that some people are more affected by environmental damages than others and may have also less capacity to recover from it. The principle of need varies among different communities and should be considered when benefits and burdens are distributed. Responsibility means that the originators of environmental problems should also repair the damages or compensate those who have carried the costs. Also, FFF activists often emphasize the responsibility principle and claim that those who have caused the problems should pay for it; all citizens should assume responsibility for what they do. Thunberg highlights: “The bigger your power, the bigger your responsibility. The bigger your carbon footprint, the bigger your moral duty” [53]. Justice as recognition represents the second dimension of the radical environmental justice framework. Some social groups are marginalized and poorly recognized compared to others in benefit distribution and sharing. Such marginalization is seen as a justice dimension itself, but also as an underlying cause of unequal distribution [50]. Procedural justice constitutes the third element of the framework, involving decision-making and power (relations).

The three elements of radical environmental justice are connected to the SDGs, because the access to safe and affordable drinking water (SDG 6), the reduction of exposure and vulnerability to climate-related extreme events (SDG 1) or the access to affordable, reliable and modern energy services (SDG 7) are all examples related to questions of distribution, recognition, decision-making and power, and capabilities. ESD aims to build “education systems that support learners of all ages to be active contributors to more peaceful and sustainable societies, in line with the 17 Sustainable Development Goals” [54]. Kopnina [55] and other scholars [56,57] criticize ESDG (education for sustainable development goals) and ask if ESDG is desirable, because the SDGs poorly address questions of distribution, justice and power relations. They even remain vague about how hunger is to be solved by producing more food, and they are highly anthropocentric. In addition, it is argued that SDG 8 promotes a neoliberal paradigm of economic growth, which is seen as a fundamental root of environmental damage and destruction and responsible for the planetary-scale decline of biodiversity, climate change and the shortage of natural resources [56]. Critical voices also take the stance that the term “development” already indicates a belief in economic growth [58,59]. Berglund and Gericke [60] note that students are perhaps aware of the discussion about tensions between a stable economic growth paradigm, resource distribution and environmental stability. Greta Thunberg and climate activists often emphasize that they only cite climate scientists, and they demand that politicians should consider and listen to what science has shown. However, the question remains what alternative models and environmental transformation measures do they propose, in addition to “official” claims e.g., by the Austrian FFF movement.

2.5. Transformative Learning

By supporting students' participation in climate movements, schools enable transformative learning processes. Such transformative learning is fostered when students realize that their actions can have a positive impact on society [13]. Therefore, involvement in climate activism can empower students and lead to environmental citizenship. Referring to the Competences in education for Sustainable Development, developed by the UN economic Commission for Europe [61], Vare et al. [62] describe competences to achieve transformation of people, pedagogy and education systems. There is a need to transform the way we educate/learn to promote "civic knowledge and engagement in thick ways" [63] (p. 106). Intrinsic motivation is important for transformative learning and for people to develop as agents of change. Building on the experience of learners represents a basis for transformation. Civic engagement and participation are essential characteristics of sustainability governance. It is thus important that citizens, and students, engage in different ways, to share their ideas and solutions to be able to contribute to social-ecological transformations in collective efforts.

Arguing that sustainability and transformation issues create new challenges for re-thinking learning and pedagogy, Lotz-Sisitka et al. [64] identify four streams of transformative learning: (a) reflexive social learning and capabilities theory, (b) critical phenomenology, (c) socio-cultural and cultural historical activity theory, (d) new social movement, post-colonial and decolonization theory. According to Wals and Schwarzin [65], the authors notice that the routine solving-approaches fall short and suggest a more systemic and reflexive way of thinking and acting. Critical phenomenology processes provide new opportunities for inquiries that do not separate place and person, and that rely on developing sensitivities and emotional experiences (see also [66]). This refers to a "balance between a critical emotional awareness and a trustful atmosphere in the learning setting", which Ojala [8] (p. 21) considers necessary to promote a transformative ESD. The third stream of transformative learning highlights that learning should develop activities that produce a view of culture as aspirational and open to system change [67]. The last point noted by Lotz-Sisitka et al. [64] refers to the argument that sustainability transitions do not come about easily. Teaching should emphasize the "struggles for an equal and just society" [68] (p. 20), which can be considered as a clear ethical orientation. According to the "Beutelsbacher Konsens" [69], formal education should not indoctrinate students. Although moralization and preconceived notions of what is correct should be avoided, teachers can share their own points of view.

Referring to the ESD 3 approach, Vare argues that transformative learning may lead to a shift of the entire activity system and redefine its purpose [70]. In this sense, transformative learning can result in a social-ecological transformation, as required by FFF activists. However, ESD and environmental education (EE) in schooling, mostly, does not reflect the transformative rhetoric of academic discourses. Educational institutions cannot adequately support transformative learning experiences, unless they themselves have experienced sufficient transformative processes consistent with this ethos [70].

In this paper, we therefore analyze students' involvement and participation in climate youth activism initiatives, such as FFF, and we question their ideas and solutions to promote social-ecological transformations, environmental citizenship and more sustainable futures.

3. Methods

3.1. Local Context and Participants

The paper is based on a mixed-methods approach including quantitative surveys with students at secondary schools in Graz (Austria) and Lisbon (Portugal), and a qualitative study in Porto (Portugal) regarding students' informal strike organization. Finally, we use student essays from a collaborative project between secondary school students involved in FFF strikes and university students in Graz.

In Graz (Austria), 326 students in five different secondary schools have been surveyed, of whom 172 (53%) had already participated in climate demonstrations organized by FFF

(Table 2). The survey took place in 14 classes: four classes of 7th grade (12/13 years old), four classes of 6th grade (11/12 years) and six classes of 5th grade (10/11 years) (Table 2).

Table 2. Number of students interviewed and number of students having already participated in FFF protests (rates within brackets represent the FFF participants).

	5th Grade	6th Grade	7th Grade
	74 (27)	58 (35)	47 (24)
		11 (1)	12 (10)
	55 (51)		
	27 (15)		
		24 (2)	18 (7)
Total	156	93	77

The survey in Graz is completed by the analysis of student essays that were written in collaboration with secondary school students engaged in the FFF movement. In the frame of a university seminar in Geography and Economics (Master's program) involving extracurricular learning in semester 2019/2020, students from University College of Teacher Education participated in a collaboration project with two secondary schools in Graz engaged in climate strikes. They formed seven groups of 3–4 university students and 3–4 secondary school students in order to develop ideas to fight against climate emergency, to discuss FFF claims and to prepare for the global climate strike on 29 November 2019 where they participated together. Then, each group had to write an essay/report illustrated by photos and/or make a film which was submitted as a collaborative output.

The exploratory research study in Porto encompassed three in-depth interviews with (a) an organization member of FFF' demonstrations in Porto, (b) a participant in FFF demonstrations, and (c) a non-participant.

Moreover, in the framework of the IRRESISTIBLE project, students from different schools in the outskirts of Lisbon engaged in research and activism initiatives about socio-scientific issues that they considered socially relevant [71,72]. In total, 293 students aged between 13 and 16 years, from 13 classes from 8 different schools, participated in the project during the 2016–2017 school year. The schools involved presented a very diverse population, from the socio-cultural point of view. Each class investigated an issue and developed an interactive exhibition on that issue. Through this intervention, it was intended to increase: (a) the students' knowledge about the science and technology associated with these controversial issues; and (b) their understanding of the complex interactions that take place between science, technology, society and the environment within these controversies. At the same time, the students were asked to reflect on the criteria that research and innovation in these areas should meet to be considered responsible. Afterwards, each class of students was invited to organize an interactive science exhibition in order to involve the general public in the reflection about these controversial topics. For both the research and the development of the exhibition, the Portuguese students were supported by their teachers, scientists and science museum experts. This support allowed them to discuss and deepen the different dimensions of the controversies and to learn about important aspects of exhibition design that can trigger visitors' attention, interest and reflection on the issues at stake and engage them in interaction with the exhibition authors.

3.2. Data Collection and Instruments

In Graz, the questionnaire, which included five questions related to the topic of climate change and 11 related to the FFF movement, was distributed by one of the authors and alternatively (due to COVID restrictions in schools) by the teachers themselves (see Appendix A). The aim of the survey was to first explore the motives and motivations of students to participate in the FFF movement related to activist theories and civic en-

gagement [13,27]. Second, we wanted to investigate the ideas and narratives of youth to solve climate emergency and engage in socio-ecological transformation [29]. In addition to the closed and semi-closed items, there were two open questions asking about ideas to fight against climate change and about student's involvement in other civic movements. The survey took place in school, during teaching lessons, in summer 2020. The empirical study contributes to the understanding of the reasons for students to participate in FFF demonstrations, and of their viewpoints on climate change impacts and climate solutions. The analysis of essays and (photo) reports produced by university students and climate activists in the frame of the collaboration project described will complete the results from the quantitative survey. As highlighted by Reis [13], if students, scientists, and politicians achieve collaboration, it can be a forum for liberating dialogue and an exercise of environmental citizenship.

In Lisbon, 13 exhibitions were developed on the following themes: 'plastics in the oceans' (five exhibitions), 'climate change' (five exhibitions), 'climate geoengineering' (two exhibitions) and 'extension of the Portuguese continental shelf' (one exhibition). These exhibitions integrated different artefacts (e.g., table-games, physical and digital posters, cartoons, models, experiments/demonstrations/ simulations) organized with the purpose of triggering reflection and discussion about the socio-scientific issues addressed. They took place mainly in the schools during some community-open days. In order to assess the impact of the process (of research and exhibitions' development as an initiative of activism about socio-scientific issues) and to know how students perceived the exhibitions' development and how it affected their competences, a mixed approach was used. The mixed methods approach included a qualitative component (involving the development of case studies) and a quantitative component (with the application and statistical analysis of a pre/post questionnaire). This paper is centred on the quantitative component with an online questionnaire, consisting of items with a five-point Likert-type scale (ranging from strongly agree to strongly disagree). The questionnaire, developed and validated specifically for this project, has been described in another article [72]. In the pre-test and post-test, 269 and 276 answers, respectively, were obtained from a total of 293 students.

As for the exploratory study in Porto, in-depth semi-structured interviews were realized focusing on: (a) the reasons to (not) mobilize in the FFF movement; (b) the concrete proposals for interrupting the climate crisis (giving attention to individual and collectively proposed measures while trying to grasp information on the individual process of politization); and (c) the opinion on the role of school in the transformational process of the climate crisis.

3.3. Data Analysis

For the qualitative data, we used an inductive research design. According to Mayring [73], we inductively established categories (recycling; nature conservation; etc.) to structure the responses to the open question dealing with ideas for combat climate emergency in Austria. The seven reports of the collaboration project between activists and teacher candidates were only considered regarding climate change solutions. The ideas complete the solutions proposed in the survey. The interviews conducted in Porto were part of an exploratory study on the mobilizations of FFF in Portugal and were analyzed through thematic analysis [74].

For the quantitative data in Graz and Lisbon we used a statistical analysis. To analyze the results obtained from the questionnaire in Lisbon, the general progression of the sample was calculated. Table 3 shows the ANOVA results, indicating whether or not there is a significant difference between the pre- and post-test results (considering $p < 0.05$). As illustrated in the table, a significant increase was observed favoring the post-test results ($p < 0.05$).

Table 3. Pre- and post-test results for the whole sample with ANOVA in Portugal.

Items	F	Sig.
1. I can plan and develop a scientific exhibit about a current and relevant science topic	10,969	0.001 *
2. Developing a scientific exhibit about a given topic allows me to learn more about it	12,739	0.000 *
3. I am able to develop scientific exhibit that raise awareness in the community to current and relevant scientific issues	4327	0.038 *
4. In my science classes I discuss current issues and how they impact my life	26,514	0.000 *
5. In my science classes I develop important and socially relevant projects	9343	0.002 *
6. In my science classes I learn how to influence other citizens' decisions about social issues related to science, technology and the environment	4335	0.038 *
7. In my science classes I am responsible for initiatives that allow me to impact other citizens' decisions about social issues related to science, technology and the environment	14,245	0.000 *

* Significant difference between pre and post-test results.

3.4. Methodological Problems and Limits of the Research Design

The empirical study is not representative, because in Graz (Austria), we worked with five different secondary schools. The schools and classes were selected based on the engagement of teachers in the Teachers for Future movement and on the personal contacts of one of the authors. For the collaboration project in Graz, different secondary schools were approached by one of the authors before the university semester started. Two teachers interested in climate activism agreed to participate in the project together with their classes or work groups. In the frame of the IRRESISTIBLE project in Lisbon, 13 classes from eight different schools participated in the study. Therefore, the collaboration with a certain number of schools is not representative, but gives some interesting insights of activism initiatives in schooling. In addition, the interviews with climate activists in Porto provide insights into viewpoints, perceptions and ideas related to climate emergency, demonstrations and the movements' organization.

According to Kirkpatrick's levels of evaluation [75]—reaction, learning, behavioral change, organizational performance, we analyzed students' and climate activists' reactions to the climate crisis and discussed possible solutions for socio-ecological transformation. The students and activists reflected their learning experiences (both with demonstrations and exhibitions) and their own behavioral change in the face of climate emergency. They also evaluated the organization of participation in climate strikes and in the collaboration project, and the performance of the exhibits. However, there are limits to the empirical studies. Addressing behavioral change and acting is different, which should be considered. The participation in the climate strike and the exhibitions was partly organized by the students/activists, but the time frame and other factors, e.g., the selection of schools and classes, were decided by the teachers and researchers. Moreover, the exercise to work on ideas and solutions to solve climate emergency and to provide socio-ecological transformations, and the collaboration with the FFF movement and their claims in Austria (Table 1), eventually guided students/activists to certain desirable approaches and influenced their ideas. This presumption can, however, not be proven.

4. Results

We structured the results in the first section on reasons and motivations of students to take part in FFF strikes in Austria and Portugal, according to the two RQs, i.e., (a) What are the motivations of students to participate in climate youth activism initiatives, namely

Fridays for Future? (b) What solutions to the climate crisis do secondary school students and climate activists suggest? The second section deals with the inspiration of Greta Thunberg as a motivation for participation. The third section discusses intersections and comparisons with other activist movements. Finally, the fourth section presents some ideas to solve the climate crisis proposed by the activists on the street and those who prepared the exhibitions.

4.1. School Strike for Climate—Reasons and Motivations

The survey in Graz (Austria) shows that skipping school was a minor reason to participate in the demonstrations (Figure 1). Rather, the main reasons to mobilize were that students were interested in the climate change issues and wanted to engage. Especially 7th grade students attached great importance to the topic and were motivated to participate in civic engagement.

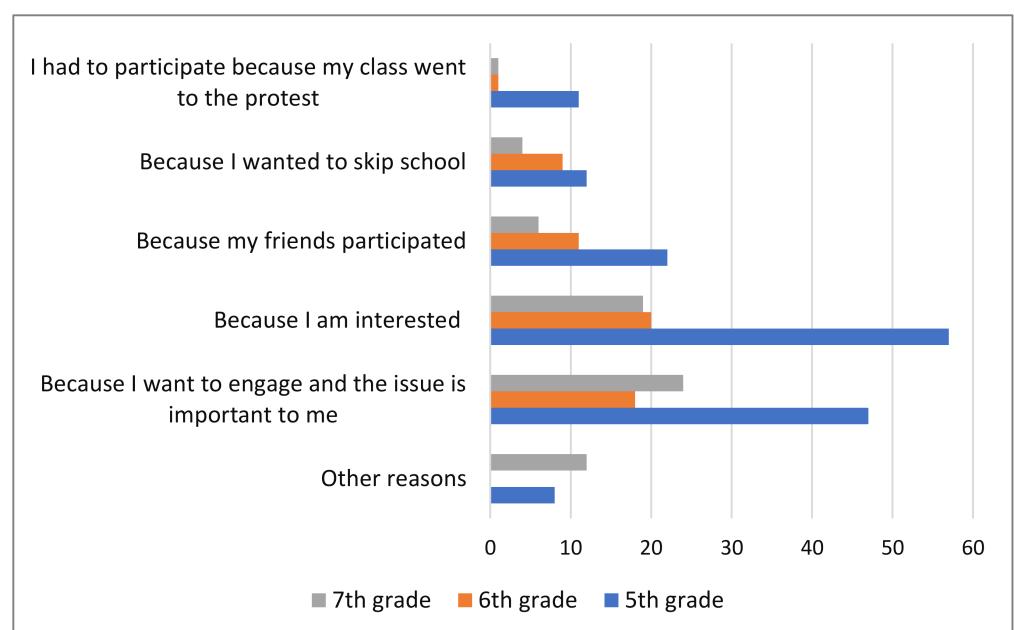


Figure 1. What were the reasons to participate in FFF protests? (282 answers from students in Graz).

The interest in the topic of the climate crisis could also be observed in the interviews in Porto (Portugal), where a student highlighted: “I went a little out of curiosity, but also, obviously, because the theme interested me.” (Andreia, interview, 2021). Another student activist calls attention to the future of the planet and the importance of taking action now:

“Having empty classrooms, having classes that are not happening is very important to see the power that the students have, to see that the students are not blind and that we are fighting for a better future and that we want to change things!” (Raquel, interview, 2021)

The activist underlines the importance of strike participants who take part without real knowledge or interest and describes how they solicit new activists:

“Although there are people who go sometimes a little clueless, it’s also important. Because these people going to these movements may gain more interest in gaining a notion and giving voice for something (. . .) we in the strikes often take a paper to write down numbers and contacts of people and ask if they are interested in participating and organizing and it’s also important.” (Raquel, interview, 2021)

A student who did not attend any demonstration explained her frustration of not participating: “It had been very good if I could attend them [demonstrations], I think it is a theme that we, youth, know it’s urgent and I think, we are all very conscious of it”

(Rita, interview, 2021)

4.2. The Inspiration of Greta Thunberg

The survey in Graz shows that Thunberg was not a significant factor for participation in the protests: only 12% of the interviewed students replied that Greta had a very strong or strong influence (Figure 2). The few students for whom the Swedish activist influenced their decision to participate “much” or “very much” were mostly younger (5th grade, 10–11 years old). Some secondary school students even supposed (after reading the book of Greta Thunberg) that Thunberg does not write her speeches alone, because she did not talk a lot in general before initiating the climate strikes on Friday. One student took a very critical stance towards Greta Thunberg:

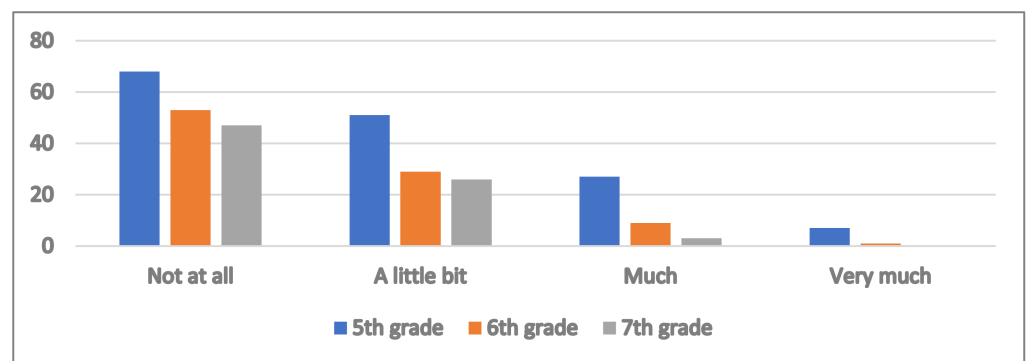


Figure 2. The “Greta effect”, namely, did Greta Thunberg affect my decision to participate in the protests?

“The father [of Greta] is currently marketing the daughter and previously marketed the mother as an opera singer. When the mother was an opera singer, she had to travel around the world, often by plane. After her career as an opera singer, she wrote the book for Greta . . . She had already been doing environmental posts on Instagram before Greta came into the limelight . . . The book was published before the first demonstrations . . . However, it’s good that Greta exists so that this topic is addressed.”

(Matthias, interview, 2020)

In the Portuguese interviews, Greta Thunberg was only evoked when directly asked and was not perceived as “the” individual reason to mobilize; she was, however, perceived as responsible for the ignition of such a large-scale movement. For all interviewees, she was considered as a crucial voice for the climate cause. The interviewees expressed their gratefulness:

“I think we are all incredibly grateful to what she started, because she took the first step to create an international space for this struggle and created a lot of awareness: she started this!”

(Raquel, interview, 2021)

“Before [Greta] people knew about it [climate crisis] but it wasn’t seen as a big problem . . . the fact that there was more talk about it, be it on the TV news, be it in the media, all this information I think made me realize that it’s not really that common . . . I started then to understand certain things . . . ”

(Andreia, interview, 2021)

Although seen as the image/voice that could sustain the public discussion for the last three years, students saw her as holding the same importance as all the other participants:

“We are all equally important and we all have an important voice to give in the movement and it is a space that is open and accessible to everyone and whoever wants to participate and fight for this has an open door, always!”

(Raquel, interview, 2021)

4.3. *The Intersection with Other Movements and the Plurality of Causes*

Only 19 out of 326 students interviewed in Austria were engaged in other social and environmental movements. Those other movements included Greenpeace (six mentions), Black Lives Matter (four mentions), Against Racism in Police Departments, Feminist movement, Free Uyghurs, German Red Cross, LGBTQ, PETA, Pupil’s union Styria, Kurdish movement, Save the Children, Sea Shepherd, Wave, WWF (all one mention). However, over half of the students interviewed have already participated in FFF demonstrations. Engagement in FFF seems to be more in vogue than enrollment in other (environmental) organizations.

The fact that FFF is using legal actions—contrary to Extinction Rebellion, for example, —seems to be a reason to immerse with the sense of safety in this movement:

“Extinction Rebellion is based on civil disobedience, which is very important, but GCE [Greve Climática Estudantil—“School Strike for Climate” in Portuguese] is also a safer space for those who cannot be willing to be stopped in civil disobedience actions (. . .) I don’t know to what extent my mother would see this situation, but registration and stuff . . . it’s not seen with good eyes, even if it’s for the right causes.”

(Raquel, interview, 2021)

By promoting spaces for people to gather in safe emotional conditions, FFF seems to promote a sustained activist network that could function as a “community”.

“[Feelings of] camaraderie, mutual support, of caring for each other, of really fighting for a cause that makes sense, a solid cause that has to exist and it’s a beautiful feeling of unity and expect many different feelings.”

(Raquel, interview, 2021)

4.4. *Solutions Proposed by Climate Activists on the Street*

Solutions that students surveyed in Graz provided include the reduction of car exhaust gases and the use of public transports (165 mentions all grades together), the reduction of waste and plastic, and recycling (76 mentions), and the promotion of renewable energies (53 mentions) (Figure 3). These three ideas are followed by the reduction of meat consumption (52 mentions), the limitation of flights (41 mentions), nature conservation and “greening of cities”, and the introduction of a CO₂ or SUV tax and other laws (both 40 mentions). These propositions are in line with Portuguese interviewees that claim both individual and collective changes, showing awareness on the structural inequalities that should be reduced to transform climate emergency.

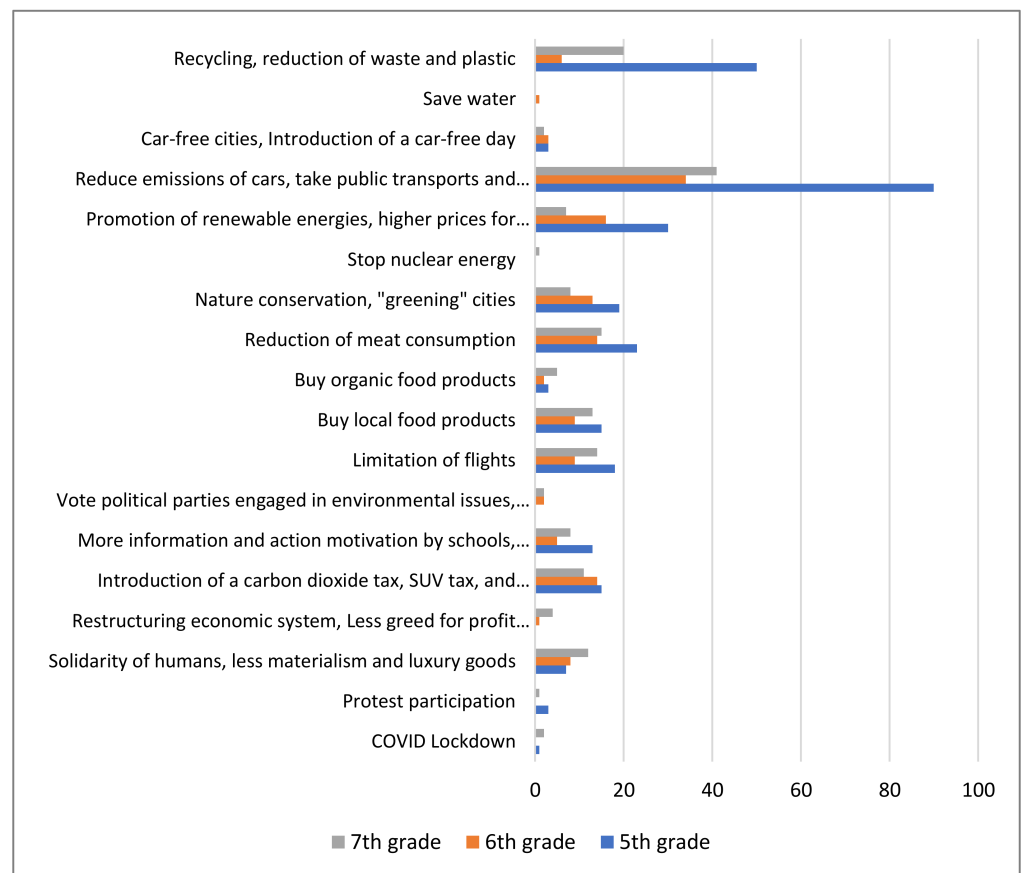


Figure 3. What climate solutions do FFF activists and their classmates provide? (number of mentions; multiple responses possible).

To buy local or organic food products is surprisingly seen as less important. All proposed climate solutions are not directly linked to social inequalities, but the introduction of a CO₂ or SUV tax would place a larger burden on those who have SUVs or use cars often. A question of climate change mitigation is—why should people affected by environmental damages should pay the costs for those who are mainly responsible for climate change (by emitting CO₂ and environmentally destructive behaviors)? The climate solutions proposed by the students interviewed do not provide the response, most of them are even very well known by political leaders. Yet, some of the ideas, such as the limitation of flights, the restructuring of the economy or the call for solidarity between humans are progressive solutions and go beyond the paradigm of green consumption.

Some of the solutions provided by the students interviewed could be observed on posters seen at FFF demonstrations, e.g., at the climate strike on 29 November 2019 (Figure 4). The poster in Figure 5, for example, claims the reduction of plastic waste in the oceans. The slogan means “In the past, the fish was packed in plastic. Today, the plastic is in [the stomach of] the fish.” Figure 6 pleads for the limitation of flights: “Short-haul flights only for insects!”



Figure 4. Secondary school students and university students together at the climate strike on 29 November 2019.



Figure 5. Poster “Plastic waste in the fish”.



Figure 6. Poster “Short-haul flights” (source Figures 4–6).

The reports jointly authored by secondary school students and university students in Graz reveal ideas of food-sharing to reduce food waste, consumption of local and organic food, vegan or vegetarian diet, reduction of meat consumption, the reduction of plastic packages, fair and sustainable clothing, second-hand clothing, and the promotion of public transports in Austrian cities.

The FFF activist Simon participating in the collaboration project states:

“My viewpoint on the claims of FFF is that even as a member I find these claims very big, but we need such extreme changes because only if we make such big changes in society and in our everyday life, we can still succeed in saving our planet. Unfortunately, small deeds are no longer enough. We would have had more time in the past to make a slow transition, but we didn’t do that. We continued to encourage the expansion of fossil fuels and now here we are with another increase in CO₂ emissions in 2018. We absolutely need a radical shift to more climate-friendly alternatives. Now” .

But even young activists question certain FFF claims and defend a critical viewpoint. Hannah for example criticizes:

“At demonstrations that take place on some Fridays, for example, there are calls for a coal and oil phase-out by 2030. This is not very well thought out, because it will lead to a heating problem. Many houses have to be rebuilt, and not all people can afford that.” She pursues that “civil disobedience is not justifiable in relation to skipping school. We must always keep in mind that not all children and young people enjoy the privilege of going to school . . . Of course, we could argue whether the climate crisis is a reason that justifies this [skipping school].”

The statement refers to the question of social inequalities and the first part (of the statement) points out the costs for a social-ecological transformation. In fact, the economic root of the climate crisis was perceived by all interviewees in Porto as an urgent issue to address:

“We [climate activists] talk about the oil industry, the companies and the modes of production that have to be changed in order to avoid climate collapse . . . the capitalism that runs our world and the exploitation that exists, the profit that is above life always”

(Raquel, interview, 2021)

The activist seems to integrate the plurality of existing inequalities while FFF speeches and actions tend to the intersectionality of fights:

“We also look at ensuring housing conditions, so that they can even withstand climatic phenomena that will happen in the coming years . . . ensuring access to water, on an equitable level, on a national level, because we are going to think about the migratory crises that can actually happen if things do not change (. . .) More developed countries don’t have that notion as much, right?! And there we can think about intersectionality, because if the most fragile people in less developed countries are having fewer resources [they] are more affected by climate change and everything.”

(Raquel, interview, 2021)

Andreia, a protest participant, observes capitalism as meaninglessness and as the common ground of inequalities:

“When there is social inequality, and you don’t have access to certain things because of political choices, it doesn’t make any sense. I don’t know if these are political decisions or choices that were made as a society [but] when there is an inequality between various social groups, that doesn’t allow certain people to have access to certain things that are necessary, a lot of that is capitalism’s fault!”

(Andreia, interview, June 2021)

4.5. Learning Impacts and Solutions Proposed by the Students Who Prepared the Exhibitions as Activism Initiatives

Regarding the items of the interactive exhibitions in Portugal, the results show that students have developed skills that allow them to: (a) build knowledge about current socio-scientific issues through investigation, understanding, reflection and discussion that are not usually presented in science classes (Item 2); (b) (re)organize and transfer knowledge to others in the form of an exhibition (Item 1) contributing to the information and awareness of the community on socially relevant topics (Item 3) (Table 3).

In relation to science lessons, students considered that the development of interactive exhibitions promote the discussion of current issues and their possible implications on everyday life (Item 4). Moreover, the exhibitions created an opportunity for a deeper understanding of the influence that scientific research and technological innovation can have on society and the relevance of society’s involvement in these issues; this was one of the common themes to all the exhibitions.

Learning strategies that can help influence other citizens’ decision-making on socio-scientific issues were another significant outcome, resulting from the development of

interactive exhibitions (Items 6 and 7). The project also provided an opportunity to carry out socially relevant initiatives, allowing students to play an active civic role by informing and discussing with visitors the complex socio-scientific issues addressed—“plastics in the oceans”, “climate change”, “climate geoengineering” and “extension of the Portuguese continental shelf”—and their interaction with society (Items 3 and 5) (Table 3).

5. Discussion: Climate Youth Activists as Agents to Change to Foster Social-Ecological Transformation?

The results of the empirical studies in Austria and Portugal provide insights to discuss both RQs. In the following discussion section, we shall analyze the motivations of students to participate in demonstrations linked to the climate activist and environmental citizenship approaches. Then, we shall discuss how the solutions proposed by the activists interviewed in Graz and Porto contribute to political leadership, environmental citizenship, and transformative learning. We also consider the results of the questionnaires related to the science exhibitions in Lisbon.

5.1. Motives and Motivation of Climate Activists

Back in 2003, Hodson [76] noted that we have to “produce activists: people who fight for what is right, good and just; people who will work to re-fashion society along more socially just lines” (p. 645). Our empirical studies have shown that young people are highly engaged in climate activism, especially in the FFF movement. Engagement in other environmental NGOs and civic movements such as Greenpeace or WWF are far behind. This large engagement in the FFF movement can be partly explained by the “Greta effect”, described by De Moor et al. [7] arguing that the climate activist Greta Thunberg has affected the participation of students in the demonstrations, nevertheless, the “Greta effect” varied between different cities and decreased between the March and September 2019 protests. In our study, the activists in Graz mostly declared that Greta was not a major reason for participation (Figure 2), while Portuguese students highlighted her influence. However, there are other, more important reasons, which explain the high rate of participation in FFF compared to other ecological or social movements and organizations (see Figure 1). Marquardt [29] stated that a key motivator for social movements, and FFF activists in particular, is “their high confidence in a future that is different from established routines and the business-as-usual scenario” (p. 4). The activists interviewed in Austria and Portugal indeed challenged established routines related to sustainability behaviors. Six reasons can partly explain the students’ motivation and their attachment to FFF activism according to the findings of our study: (a) a bottom-up approach leading to intrinsic motivation [31] in setting up the demonstrations on Friday: Greta, other school children, classmates, friends and/or myself decided to strike for measures against climate change; (b) feeling of identification with the movement due to the bottom-up process. The non-hierarchical organization and the feelings of camaraderie and mutual support are motivating to participate in FFF demonstrations; (c) an urgent need for action considering rapid environmental changes and increasing natural hazards and catastrophes. The importance and the interest in the topic underline the urgent need for action; (d) the movement gives “us”, the children, a voice in a world dominated by adults (in school, in politics, etc.); (e) an obvious gap between what political leaders do and what they promised at the COP 2015 in Paris and other national and international meetings; (f) Positive feedback and encouragement by teachers and social media. In the present study, teachers supported and encouraged school students to participate in climate activism. The participatory culture of social media appears to be appropriate for climate movements, and climate initiatives such as FFF use social media to announce events and to increase participation [2]. In addition to the occupation of public spaces, mediated communication is a key characteristic of modern protest movements, highlighted already by Gerbaudo [77].

The participation in climate activism therefore empowers young people who are demonstrating their political leadership and agency [11,13], which is also illustrated by the exhibitions project in Portugal. Even when integrated into school activities, activism

initiatives can have significant positive impacts on students' perceptions of their activism skills and of science classes. Given the results, we can conclude that the development of interactive exhibits by students on controversial "cutting-edge" science topics contributed to an improved perception regarding the skills needed to develop exhibitions in science classes as a way of raising awareness about the interactions between science, technology, society and environment. The project also resulted in an improvement in the students' perceptions of the science classes where the exhibits were developed, contributing to the reinforcement of perceptions of these classes as a place to: (a) discuss current issues that affect their lives; (b) develop relevant social projects; and (c) learn to influence other citizens' decisions about social issues related to science, technology, and the environment. According to the students' perceptions, the development of interactive exhibitions in the classroom context is a strategy that not only provides the development of skills for their realization, but also creates the opportunity to raise community awareness about socio-scientific issues and promotes a more motivating and meaningful classroom environment for students.

5.2. Environmental Citizenship and Political Leadership of Activists

Referring to Routledge et al. [78], climate justice means that climate solutions (mitigation and adaptation) must amend social inequalities rather than embed them. This refers to the four core elements of environmental justice (distributive justice, recognition, procedural justice, capabilities), suggested by Fraser [48], Schlosberg [49] and Svarstad and Benjaminsen [50]. First, we have to ask what solutions do climate youth activists and other engaged students provide? Additionally, we need to ask if such climate solutions rectify social inequalities?

Climate solutions proposed by the students interviewed in Austria show that there seems to be an increasing awareness concerning environmental damages and climate emergency. One of the Portuguese activists points out social inequalities between the Global North and the Global South, and defines capitalism as a source for environmental destruction and disparities (Raquel, interview). FFF activists often request political leaders to act, because the "house is on fire". The introduction of a carbon dioxide or a SUV tax, the promotion of renewable energies and other laws constitute political measures that leaders should implement. Nevertheless, the students interviewed also require more personal behavioral changes, including less meat consumption or the purchase of local food products (see Figure 3 and statement of the activist Simon). Such societal solutions refer to the consumer assuming responsibility at an individual level [58].

According to an interviewee in Porto (Raquel, interview), FFF activists try to recruit new "members" at climate strikes. However, the question remains what activists will reply or do when people do not comply with their claims. Doolen [2] notes that expertise and trustworthiness are necessary for credibility. Based on our empirical studies, we argue that there are several ways that activists can react. The first is to strengthen advertisements to convince opponents, mostly in social media. Second, activists can collaborate with scientists to enhance credibility. Third, they create political parties to participate in elections and try to influence public opinion. This happened in the German land Baden-Wuerttemberg, where FFF activists founded the party "Klimaliste" in September 2020 [79]. In March 2021, the young political party ran for regional elections, but only gained 0.9% of the voices in the south-eastern federal state in Germany.

Even if Greta Thunberg or Luisa Neubauer as FFF representatives give talks at national and international conferences, FFF is a non-hierarchical organization; there is no supra-national committee or director. Everybody can initiate actions and disseminate via social media, even if FFF is a registered trademark. The "Greta Thunberg and Beata Ernman Foundation" registered the word-mark the word mark "Fridays for Future" at the EU Intellectual Property Office in December 2019, which means that other organizations and companies are not allowed to use it. Protestors can still draw posters with the word mark for FFF demonstrations. However, according to the statement of one of the Portuguese activists interviewed (Raquel, interview), the FFF movement "is open and accessible to

everyone". The opening of possibilities for participating in a process towards environmental sustainability links non-hierarchical relations with strong solidarity bonds. Integrating affect into the fabric of social movements [7–10], promotes meaning, consistency, and commitment to a common struggle. As Doolen [2] highlights, this participatory culture can be shown "in messages of gratitude to participants, or in congratulations to a movement leader in social media" (p. 32). The conviviality fostered in the depicted spaces aims to enable all attendants "to achieve a sense of themselves as acting subjects in the world and by breaking out of damaging binaries of 'us' and 'them'" [80] (p. 141). In the process, actors can rely on and support each other in a path towards environmental sustainability and gaining knowledge through these interactions.

The strong solidarity bonds and the common struggle against climate emergency also relates to the dimension of procedural justice, as an element of radical environmental justice [50]. Even if most FFF activists are not involved in political decision-making, they can raise their voice through climate strikes and receive greater attention through speeches at climate conferences and political meetings. Therefore, the aim is to empower youth gaining recognition and participating in political debates concerning global environmental changes.

5.3. Integration of Climate Activism into ESD and Transformative Learning

We acknowledge that FFF strikes pose a series of challenges for school teachers, not only concerning skipping school lessons, but also in providing an open dialogue and a democratic classroom including critical thinking. However, transformative learning that implies a change of identity can result in defining new purposes and aims for problems related to environmental changes and can, thus, lead to innovative solutions [2,4]. As Lotz-Sisitka et al. [64] and Mukute and Lotz-Sisitka et al. [67] note, transformative learning should provide activities, which enable aspirational perspectives open to (societal) system change. For transformative learning, it is important to learn in a social environment, which inspires new ideas and reflections. Climate demonstrations provide alternative social environments, if students engage and deal with pressing issues, and do not perceive the demonstrations as just skipping school. Transformative learning should prepare students for societal change. Referring to Olaja [8], hope and trust can enable students to face and respect a diversity of standpoints and conflicting views. The interviews and surveys in Austria and Portugal have shown a critical environmental awareness of students. They engage in societal transformation processes and want to influence public opinion related to the climate crisis, because they consider climate change and global environmental changes as highly relevant.

By learning how to influence other citizens' decisions about social issues related to science, technology and the environment (Table 3), Portuguese students realized the transformative potential of their activist initiatives (the exhibitions). Therefore, the development of exhibitions related to climate change and global environmental changes contributes to transformative learning. It implies a change of identity, because the students notice the impact of their ideas and solutions proposed by their exhibitions. They become active problem-solvers instead of simple spectators, which can be seen as a major aspect of education for environmental citizenship [13]. As highlighted by Cruz et al. [81], students want "to be listened to and their suggestions taken into account for policy-making" (p. 21).

As we highlighted in the section on methodological problems and the limits of the research design, we, teachers and researchers, eventually guided and orientated students towards certain desirable outputs. Dealing with action research approaches, David [82], considers his position as a researcher as problematic because project co-coordinators wanted to please the funders and the nature of the research "was tied to facilitating the goals of project" (p. 15). He questions the 'goals' that research aims to enable. In our study, the researchers and teachers guided students towards climate activism and civic engagement, but participants should critically reflect the project and they were free to choose thematic focuses both for the exhibitions in Lisbon and the outputs (essays and photo reports) in

Graz. Even if researchers and teachers supervised the projects, students and activists involved were not indoctrinated, according to the “Beutelsbacher Konsens” [69]. In Graz for example, they were free to organize the form of the output (essay, video and/or photo report) and the thematic focuses. Students sometimes criticized the costs of certain transformation measures claimed by FFF, skipping school (because going to school is perceived as a privilege that not every child has) and the position of Greta Thunberg. Social inequalities, thus, overlap with climate emergency.

Climate activism and the ideas and solutions that such engagement, i.e., participation in climate strikes and development of exhibitions, produce and can foster social-ecological transformations that curricula and textbooks do not provide. As we have seen in the results from Graz, climate activists and their classmates proposed sometimes radical solutions, they therefore challenge official ESD discourses and promote alternative environmental actions and citizenship. They seem to be aware of the tensions between a neoliberal growth paradigm and environmental degradation. As Koprina argued in a recent critical paper on ESDG [55], alternative economic education including education for degrowth and steady-state economy, in addition to eco-pedagogy and Indigenous and traditional learning, can make a major contribution to alternative forms of sustainability and environmental education. The paradigm of ongoing economic growth is questioned by climate solutions such as less materialism and luxury goods, limitation of flights, and reduction of meat consumption (Figure 3), which refer to degrowth approaches [83]. The interviews in Porto and the statements in student essays from Graz have also shown that activists consider radical measures in order to promote societal changes. The FFF activist Simon for example thinks that “big changes in society and in our everyday life” are needed. By discussing alternative and radical ideas and using them as an asset in ESD teaching, classroom teaching can be a space for open-dialogue that consider students’ and activists’ experiences and perspectives, including critical ones that scrutinize “green gestures”. In addition to sustainability consciousness and awareness raising, concepts such as self-determination and risk perception [84] could then be added to the discussions.

6. Conclusions

We have shown that participation in FFF strikes and development of interactive science exhibitions related to climate change, plastics in the oceans and climate geo-engineering contribute to environmental citizenship and transformative learning experiences. Based on empirical studies with 326 Austrian and 293 Portuguese secondary school students and one exploratory study in Porto, we found awareness raising concerning climate emergency, an increasing consciousness, and demonstrations and exhibitions can be used as “triggers of change” for transformative learning.

Both activism initiatives, demonstrations and exhibitions, are bottom-up activities developed and shaped by the students themselves. Bottom-up and top-down drivers of sustainability and socio-ecological transformation work in parallel and often synergistically to promote environmental awareness raising and citizenship. By proposing innovative and, sometimes, radical solutions to the climate crisis, such as less greed for profit of private companies or the limitation of flights, the interviewed students show their political participation and leadership as citizens within a democratic system. Even if the variety of ideas and solutions also show dissent and divisions from moderate to more radical within the climate movement, the activists engage in political dialogue. By discussing their exhibitions and their claims in the frame of demonstrations, they contribute to scientific knowledge transfer. This attempt to hold a deliberative model inside school classes while valuing student actions is an important way to open schools for the urgent struggle against climate emergency. Students want to fight for their convictions, which is in line with Sterling [57] and other scholars [55,85] who claim a shift in (environmental) consciousness instead of sustainability prescriptions and anthropocentric perspectives.

Emotions and feelings of solidarity, collective aims and breaking with routines are motives to participate in climate strikes and integrate the FFF movement. Intrinsic mo-

tivation to participate is also encouraged by teachers and feedback in social media. The strikes provide space for intergenerational justice and to be included in social-ecological transformation processes. They, thereby, participate in democratic debates and stand up for more sustainable futures. However, we also have to highlight the character of climate strikes as social happenings and gatherings, which participants do not necessarily link to climate emergency.

The proposed solutions clearly go beyond the SDGs and formal ESD by suggesting alternative economic models and radical ideas such as car-free cities. The tensions between formal ESD, which has been largely integrated into schooling already, and the claims of climate activists should be addressed in the classroom. Why are the SDGs not enough from the point of view of the activists? In what points do the claims go further, e.g., system change, degrowth approaches, etc. and what are the arguments? Social inequalities, as argued by the students and activists interviewed, should be considered in fighting against the climate crisis, also within activist movements.

For a better integration of (climate) activism and environmental citizenship into formal education, we recommend a) to provide space for participation of students in political dialogue; b) to incorporate climate activism and critical reflections on activism into school curricula, including the discussion of different perspectives and also dissent, c) to train teachers in scientific knowledge on climate change and environmental justice; and in climate activism. Classroom discussions on structural causes of environmental problems can indeed promote political participation through democratic means, and enable critical ESD and environmental citizenship.

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Appendix A. Questionnaire in Austrian Secondary Schools

Fragebogen: Klimawandel & Fridays For Future

Information: Mit dem Ausfüllen dieses Fragebogens unterstützt du mich bei meiner Bachelorarbeit zum Thema „FRIDAYS FOR FUTURE“. Mit Hilfe dieser Umfrage möchte ich analysieren, inwieweit sich Schülerinnen und Schüler in Steirischen Schulen mit dem Thema Klimawandel und mit der Fridays For Future-Bewegung beschäftigt haben. Außerdem möchte ich gerne fragen, welche Schulen ihren Schülerinnen und Schülern solche Möglichkeiten angeboten haben. Die Daten werden anonymisiert, Namen von Einzelpersonen werden nicht erwähnt.

1. Name der Schule: _____
2. Klasse: _____
3. Alter: _____
4. Geschlecht: Mädchen Junge

Fragen zum Klimawandel allgemein:

1. Habt ihr im Unterricht bereits den Klimawandel behandelt?
 - Ja Nein Weiß ich nicht mehr
- 1.1. Wenn ja, in welchen Fächern?
 - Geschichte & Politische Bildung
 - Geographie & Wirtschaftskunde
 - Deutsch
 - Englisch
 - Physik
 - Chemie
 - Psychologie & Philosophie
 - Anderes: _____
2. Hast du mit deinen Eltern bereits über den Klimawandel gesprochen?
 - Ja Nein Weiß ich nicht mehr
3. Hast du Angst vor den Auswirkungen des Klimawandels?
 - Viel Angst Wenig Angst Keine Angst Es ist mir egal
4. Was wären für dich die schlimmsten Auswirkungen den Klimawandels? Kreuze 2 der Auswahlmöglichkeiten an.
 - Auftauen von Permafrostboden
 - Absterben von Korallenriffen
 - Aussterben vieler Tierarten
 - Rückgang von Gletschern
 - Anstieg des Meeresspiegels
 - Zusammenbruch des kapitalistischen Wirtschaftssystems
 - Zunahme von Extremwetterereignissen (Stürme, etc.)
 - Starke Temperaturzunahme
 - Intensivierung des Treibhauseffektes
 - Anderes: _____

Fragen zu FRIDAYS FOR FUTURE:

1. Hast du bereits an Demonstrationen oder Treffen der *Fridays for Future*-Bewegung teilgenommen?
 - Ja Nein
- 1.1. Wenn ja, wie häufig? 1 Mal 2-3 Mal 4 Mal und häufiger
- 1.2. Wenn ja, wie bist Du zu den Demonstrationen/Treffen hingegangen? Wenn du an mehreren Demonstrationen teilgenommen hast, kannst du auch mehrere Antworten ankreuzen.
 - Alleine
 - Mit Freunden
 - Mit Geschwistern
 - Mit Eltern
 - Mit der ganzen Schulklasse, ohne LehrerIn
 - Mit der ganzen Schulklasse, mit LehrerIn
- 1.3. Wenn ja, was war deine Motivation zu diesem Treffen/Streik hinzugehen? Bitte kreuze 1-2 Antworten an.
 - Ich musste teilnehmen, weil meine ganze Klasse hinging.
 - Ich wollte von der Schule gerne frei haben.
 - Ich bin hingegangen, weil alle meine Freunde hingingen.
 - Ich wollte aus Interesse unbedingt hingehen.
 - Ich wollte hingehen, weil mir das Thema sehr am Herzen liegt und ich mich engagieren möchte.
 - Andere Gründe: _____
2. Habt ihr im Schulunterricht bereits mit LehrerInnen über die *Fridays for Future*-Bewegung gesprochen?
 - Ja Nein Ich kann mich nicht daran erinnern
3. Kennst du Greta Thunberg?

- Ja, ich habe schon viel von ihr gehört und weiß wofür sie steht.
- Ja, ich habe schon mal von ihr gehört.
- Nein, ich habe noch nie von ihr gehört.
- 3.1. Wenn ja, hat dich Greta dazu motiviert an Klimastreiks teilzunehmen?
- sehr stark stark ein wenig gar nicht
- 3.2. Wenn ja, hat Greta dein Interesse am Klimawandel geweckt?
- sehr stark stark ein wenig gar nicht
4. Bist du noch in anderen Bewegungen außer bei *Fridays for Future* aktiv (Greenpeace, Extinction, Rebellion, etc.)?
- Ja Nein
- Wenn ja, in welcher Bewegung/ bei welchen Bewegungen? Nenne diese bitte. Seit wie vielen Jahren bist Du dort aktiv? Bitte nenne die Anzahl der Jahre.
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5. Welche Lösungen möchtest du vorschlagen um die Klimakrise zu bekämpfen? Welche Ideen hast Du. Bitte in Stichworten.
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