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Schools Transitioning Towards More Climate Awareness

A Multi-Level Analysis of Climate Protection Projects in the German School System

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Foreword

Amelie Vogler wrote her master's thesis as part of our *Schools4Future* research project. She succeeded in an excellent way to present schools as socio-technical systems and to analyze actors from the multi-level perspective of transition research.

A core question in the work is that of drivers and barriers for climate protection in schools. Ms. Vogler knowledgeably and in detail explores the question of how the actors of climate protection projects assess the possibilities for a change towards more climate awareness in schools and has analyzed various aspects and developments of the school system for this purpose. It is a particular merit of the present work that Ms. Vogler was able to present school as a socio-technical system in a transformation process towards more climate awareness. The well-designed, conducted and analyzed interviews with experts from the school system lead to remarkable insights and show a variety of rules, structures and practices that constitute and represent the school system, as well as interactions and dynamics between the actors that play a crucial role for climate protection processes in schools.

By choosing a multi-level perspective (MLP) analysis of the German school system, Ms. Vogler was able to present climate protection projects as examples of niche activities in schools. The results show that the German school system is particularly rigid and characterized by deeply rooted normative role dynamics and an unappreciated role of schools in society. Structurally preserving and complex interconnected regime elements characterize the school landscape and make it difficult to bring the necessary momentum to school climate change projects. Although many positive factors could be found, which are quite suitable to implement more climate protection activities in schools, it becomes especially clear that the school system is faced with numerous obstacles to climate protection. The work of Ms. Vogler also shows that many things do not have to be accepted permanently, but could be changed. Many of the obstacles are man-made and politically intended. Rigid, regulatory rules that exist at the level of the regime are a structural barrier to the better integration of climate protection in the school system. This is distressing, but it also shows that it is not laws of nature that shape the current situation. After all, obstructive structures and formal requirements at the school level have been politically determined and can therefore be changed. While the inherent rigidity of the school system is therefore a crucial obstacle, it also shows that this obstacle can be overcome if there were the political will to do so. Thus, the result of the work is also an urgent appeal to political decision-makers to give schools more leeway for climate protection activities and to significantly revise the curricula as well as teacher training with regard to the requirements of climate protection.

The entire cooperation of Ms. Vogler in the *Schools4Future* project was a great enrichment for us. We are very pleased to be able to publish her work in the WI series “Wuppertaler Studienarbeiten zur nachhaltigen Entwicklung“.

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I also want to thank my thesis supervisors from the universities of Graz and Basel, Thomas Brudermann and Basil Bornemann, for their inspiration and support, not only for this thesis, but throughout my entire master program. Getting to know your insights and views on sustainable development has enabled me to develop my own perspectives and to discover new interests and areas of expertise.

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Abstract

This thesis conceptualizes the school as a socio-technical system, in which change towards sustainable development and a transition towards more climate awareness are necessary. The multi-level perspective (MLP) framework is applied to the German school system and to climate protection projects (CPPs) as examples of niche activities integrating climate protection (CP) in the school. The thesis utilizes the analytical levels of the MLP (landscape, regime, and niche) and the concept of regulative, cognitive, and normative rules and addresses the question: How do actors in CPPs perceive drivers and barriers for transitioning towards more climate awareness in the German school system? The data were collected through expert interviews and analyzed by conducting a qualitative content analysis.

The results show that the German school system is characterized by an inherent rigidity, deep-set normative role dynamics, and an unappreciated role of schools in society. They also highlight the importance of public pressure, strategic CP orientation, and hands-on approaches. CPPs can be a driving force for this in individual schools, but, overall, CP needs to be addressed more systematically in the school and more substantial efforts and reforms are necessary. Highly motivated niche actors play an important role and represent key drivers for such developments.

This thesis reveals the complex and systemic nature of the challenges the German school system is faced with. It highlights the difficulties of integrating CP and the importance of substantial and transformative political action. The thesis demonstrates the crucial need to recognize the significance of schools and their actors for society and to integrate new methods and approaches into the school. This thesis also contributes to the body of literature on socio-technical systems and sustainability transitions. It offers an operationalization of the MLP and reveals strengths and limits as well as future research outlooks.

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List of Abbreviations and Terms

Abbreviations specific to this thesis (by order of appearance):

MLP	Multi-level perspective
CP	Climate protection
CPP(s)	Climate protection projects
IP	Interview partner
ADM	Political-administrative actors
IG	Network partners and interest group actors
STU	Students
TE	Teachers
DRIV	Driver
BAR	Barrier
COG	Cognitive
NORM	Normative
REG	Regulative
Pos.	Position

General abbreviations and organizations (in alphabetical order):

BMBF	Bundesministerium für Bildung und Forschung (translation: Federal Ministry of Education and Research)
BMUV	Bundesministerium für Umwelt, Naturschutz, nukleare Sicherheit und Verbraucherschutz (translation: Federal Ministry for the Environment and Consumer Protection)
BMWK	Bundesministerium für Wirtschaft und Klimaschutz (translation: Federal Ministry for Economic Affairs and Climate Action)
BUSEB	Bundesverband Schule Energie Bildung e.V. (translation: Federal Association “School - Energy - Education”)
EG	*Energie gewinnt* (researcher’s translation: “energy gains”)
ESD	*UNESCO Global Action Program on Education for Sustainable Development*
FFF	*Fridays for Future* movement
GMW	Gebäudemanagement Wuppertal (translation: municipal building management of the city Wuppertal)
Ifeu	Institut für Energie- und Umweltforschung, (translation: Institute for Energy and Environment Research)
KLP	Kernlehrpläne (researcher’s translation: core curricula)
KMK	Kultusministerkonferenz (translation: Standing Conference of the Ministers of Education and Cultural Affairs of the *Länder*/constituent states in the Federal Republic of Germany)
MSB	Ministerium für Schule und Bildung des Landes Nordrhein-Westfalen, Ministry for School and Education of the constituent state North Rhine Westphalia
NCI	National Climate Initiative
NRW	Nordrhein-Westfalen, German constituent state of North Rhine-Westphalia
STEM	Refers to education in the fields of science, technology, engineering, and mathematics
S4F	*Schools4Future*
UfU	Unabhängiges Institut für Umweltfragen e.V. (translation: Independent Institute for Environmental Issues)
ZDI	zdi netzwerk

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1 Introduction

1.1 Problem Definition and Relevance

Human activities on earth have created an unprecedented and irreversible environmental crisis, making global climate change the most central and dangerous challenge for humanity (Rockström et al., 2009; Steffen et al., 2015). Many attempts and actions have been proposed and undertaken to safeguard human existence; most recently, the groundbreaking Paris Agreement has established goals to limit global warming to 1.5°C (Otto et al., 2020; Schäpke et al., 2017). Furthermore, the concept of sustainable development (SD) emphasizes the interlinkages of economy, society, environment, and politics and provides a compass for a more sustainable human development with combatting climate change as a determining goal (Otto et al., 2020; Sachs, 2015).

However, to date, many efforts have been inadequate in addressing the complex challenges and more substantial actions are required (Bamberg et al., 2021). To enable appropriate action and change how humans interact with their environment, innovative and radical solutions need to be developed and applied. This underlines not only the complexity of studying sustainability-related problems, but further, the need for multi-level approaches.

One approach is the multi-level perspective (MLP) on socio-technical transitions. The MLP is a framework to study the complexities of radical societal change. Hereby, it conceptualizes that today's societies consist of highly complex and interconnected socio-technical systems and that change, or transition, is a dynamic, multidimensional, and nonlinear process (Geels, 2012). In the context of SD, these processes are referred to as sustainability transitions (Geels et al., 2018). The MLP provides a suitable framework by analyzing change according to distinct elements (actors, technologies, and institutions) and analytical levels (niche, regime, and landscape). The need to apply the MLP is further highlighted by "the recognition that many environmental problems [...] comprise grand societal challenges [which] require radical shifts to new kinds of socio-technical systems [...]" (Köhler et al., 2019, p. 2).

Overall, the magnitude and the systemic nature of the challenges regarding climate change point to the fact that change must be far-reaching and transformational and singular technological innovations are not sufficient (Otto et al., 2020; Schäpke et al., 2017; Schneidewind and Scheck, 2013). Bamberg et al. (2021) raised important questions on the role of social practices and human behavior. Other research highlights the significance of education in social transformations (Otto et al., 2020). In fact, schools are becoming places for change with increasing awareness of climate change concerns. The *Fridays for Future* (FFF) movement has further amplified the voices of school children and emphasized the importance of supporting schools to in their efforts for climate protection (CP) and to contribute to SD (Evensen, 2019). Moreover, education and the school system are new

fields in the research on socio-technical transitions and the MLP and there is a significant gap of knowledge on sustainability transitions in the school system.

This thesis addressed this gap of knowledge and provided an analysis of transition processes in the German school system and, by this, underlines the importance of SD for educational institutions.

1.2 The *Schools4Future* Project

This thesis is a contribution to the *Schools4Future* (S4F) project, which aims to realize climate-neutrality in German schools. The project is funded by the German Federal Ministry for Economic Affairs and Climate Action (BMWK) (formerly, the Federal Ministry for Economic Affairs and Energy, BMWi) and is carried out by the Wuppertal Institute (WI) for climate, environment, and energy research and the consulting firm Büro Ö-quadrat. It was launched in mid-2020 and selected twelve secondary schools in Germany as pilot schools.

The motivation to target schools lies in their importance as public institutions to educate the young generation, but also in the significant reduction potential of greenhouse gas (GHG) emissions. Hereby, S4F addresses climate-neutrality as a central goal for the school system and focuses on raising awareness about GHG emissions in day-to-day school operations and on assessing the carbon footprint. Furthermore, it plans to implement targeted emission reduction measures and to promote changes in attitudes and behavior (Schools4Future, 2019). For this purpose, the project team works closely with students and teachers at the involved schools and, particularly, students are encouraged to take the lead in developing comprehensive climate actions. While the project does not prescribe a specific topic or focus for possible climate actions, it does suggest key areas for GHG emission reductions; such include building energy and renewables (electricity, thermal energy, and warm water consumption), mobility as well as cafeteria and procurement (mainly, paper supply).

The thesis at hand is a scientific contribution to the project and offers a systemic perspective on S4F and similar projects, referred to as climate protection projects (CPPs). It provides an analysis of school-based CP activities, the involved actors as well as the practices and structures of the school system with the overall goal to understand the role of schools and these projects in transformational change.

1.3 Research Objectives and Outline

The goal of this thesis was to understand the role of schools in transformational change. More specifically, the thesis focused on different aspects of climate awareness in the school context from the point of view of actors involved in CPPs and analyzed the role of such projects in potentially triggering or facilitating a transition towards more climate awareness. This thesis addressed the existing gap of knowledge on sustainability transitions in the school context and, in doing so, underlines the importance of studying the implications of SD for educational institutions. Hereby, the MLP provided a unique and suitable framework for analyzing the complexities of transitions. The framework was operationalized in this thesis to help explore and understand the complex structures of the German school system and of issues involving CP.

The point of departure for this thesis was the assumption that CPPs and the involved actors play an important role in a potential transition of the school system towards more climate awareness. Hence, the main focus lied on studying processes and elements related to socio-technical transitions in the context of schools and CPPs.

The research was based on three key objectives. First, the research aimed to identify driving and hindering forces to transition processes in the school system. Second, this thesis utilized the concept of rules as proposed by the MLP and the transition literature in order to gain an understanding of rules, practices, and structures that constitute the school system. The third goal was to add characterize the variety of actors within the school system and the nature of their interactions and relationships. In addressing these objectives, the following research question (RQ) was developed:

How do actors in climate protection projects perceive drivers and barriers for transitioning towards more climate awareness in the German school system?

To complement the main research question, two sub-questions were developed. The first sub-question (SQ1) referred to the second research objective on the concept of rules in socio-technical systems. The goal was not only to understand the established rules at the so-called regime level, but also to explore rules that are unique in innovative activities in the so-called niche and which explicitly differ from the established regime level.

SQ1: What are the rules that constitute the school system and that are associated with the integration of CP?

The second sub-question (SQ2) focused on the actors in the niche, the structuration, and the interactions that they cultivate. This question explored the current configurations of actors in the niche and the way, in which they operate and collaborate.

SQ2: *Who are the relevant actors in the school system and how do they interact with each other?*

The research was designed to focus on qualitative and specific insights into the school system. Therefore, qualitative expert interviews were chosen as a method for data collection. The data were analyzed with the help of the framework for a content-structuring qualitative analysis by Kuckartz (2018). For the interview process, the central focus lied on interviewing actors at the niche level in order to gain an understanding of the actors' perceptions of the school system, CPPs and other approaches to CP, and the role of climate awareness in the school context.

This thesis is structured into seven chapters. Following this first and introductory chapter, chapter two and three provide theoretical backgrounds, respectively, on the German school system and CP as well as on socio-technical transitions and the MLP. The fourth chapter gives a detailed outline and explanation of the methods for data collection and analysis that were employed in this thesis. Chapter five presents the results gathered from the analysis and structures them according to, first, the two sub-questions, and then, according to the main research question. In chapter six, the results are discussed and interpreted in the context of the overall scientific discourse and the broader context of related topics. It further provides a critical reflection on the research process and the chosen methods and identifies limitations of this study. The seventh and last chapter concludes the thesis with a summary of the research process, the results, and their implications and gives an outlook on potential future research.

2 Schools as a Place for Change

2.1 The German School System and Education Policy

In Germany, education is organized in a federal system. While it differs considerably among the sixteen constituent states (in German: “Bundesländer” or “Länder”), the framework and basic structures are very similar in each state (Kultusministerkonferenz (KMK), 2021). Most notably, the education system is divided into different areas of education, or sectors. Overall, there are five different sectors: the elementary sector (includes early childhood education, infant day care, kindergarten, and preschools), the primary sector, the secondary sector I and II and, finally, the tertiary sector (includes traditional universities, colleges or universities of applied sciences, and vocational training programs) (Edelstein, 2013).

The thesis at hand explicitly focused on the school system (as a part of the overall education system) and here on the secondary sector I and II (in German: “Sekundarstufe I und II”) (Edelstein, 2013). Secondary education is divided into different grade levels. Lower and intermediate grade levels correspond to the secondary sector I in German education; they include grades five through ten and students of the age of ten to fifteen. The subsequent secondary sector II is made up of the upper grade levels (eleven, twelve, and, depending on state regulation, thirteen) and includes students who are between sixteen and eighteen. The secondary sector II concludes with the general higher education entrance certificate (in German: “Allgemeine Hochschulreife”) (Hepp, 2011). Alternatively, the secondary sector II also includes the dual vocational education which combines vocational trainings with formal education.

When it comes to education policy, the sixteen constituent states of the German federal system each have rights and autonomies, the so-called cultural sovereignty (in German: “Kulturhoheit”) (Eckhardt, 2019). This passes the main control of setting and regulating framework conditions for this policy domain and makes each constituent state the provider and financier of education (Hepp, 2011). Because education policy is one of the very few domains, in which the states have such autonomy, it is at the heart of each state’s policymaking and public debate on education topics are often controversial (ibid).

The federal state (in German: “Bundesrepublik” or “Bund”), on the other hand, has the challenging task to streamline and to consolidate education policy throughout Germany strategically; naturally, the range of potential tensions is manifold (Kussau and Brüsemeister, 2007). Even though there are increasing efforts for harmonizing the education system throughout the sixteen constituent states, there exists a patchwork of different approaches on school legislation and governance (Hepp, 2011). Here, main differences lie in the way certain issues are framed and dealt with, for example, secularity (the separation of church and state), notions of German heritage, or other similarly normative, sensitive matters.

The core domains of school policy, however, are the same in each state. They include, amongst others, the decision-making authority regarding the following issues: basic educational objectives, organizational structures, contents and structure of different school types (including curricula), control over teaching matters, tasks and range of responsibility of different school bodies (such as the school supervisory body, the school administration, or school conferences, including its participants teachers, parents and students), as well as guidelines for the municipal school authority structures (including matters of school costs) (Hepp, 2011; Schüttler-Hansper, 2018). While the cost of schools, such as the necessary infrastructure and management, are attributed to the municipal school authorities, teachers are employed by the constituent state in civil service employment (§57 (4) SchulG).

Within each constituent state, the responsible body for the school is the school authority (in German: "Schulträger"). These responsibilities usually lie within the municipalities, e.g., within the city government (§78 (1) SchulG). In some cases, school authorities can also be administrative bodies independent from public institutions, examples include churches or private associations such as the Waldorf schools (Forum Bildung Digitalisierung e.V., 2020). However, around 90 percent of schools in Germany are maintained through public school authorities (ibid).

The tasks that the school authority fulfill are manifold. In essence, it is responsible for establishing, maintaining, and administering schools and they bear the costs of equipment (Eckhardt, 2019). Furthermore, the school authority must provide and maintain the appropriate facilities and materials for teaching, the necessary technological equipment, and the necessary administrative personnel (§79 SchulG). This underlines the complexity of the school system: as specific teaching matters lie in the policy domain of the superordinate constituent state, but the school authority carries the important responsibility of administering schools and maintaining the system on a day-to-day basis.

Apart from the formal organizational structures, the school system in Germany is shaped by a multitude of diverse actors and the connections between them. School policy would be meaningless without the various inputs from teachers, decision-makers, students, and parents (Kussau and Brüsemeister, 2007). In essence, the school as an institution is a combination of the competences and skills as well as the motivation from the actors involved. Due to this complexity and dynamic character, it is essential to comprehend the school system as a compound and multiple level structure (Kussau and Brüsemeister, 2007).

2.2 Students and the *Fridays for Future* Movement

Most recently, schools have become places for change when the global *Fridays for Future* movement (FFF) called attention to the school's role in addressing and combating climate change. FFF started out as a school strike in Sweden. Fifteen-year-old Greta Thunberg went on strike to protest the school's and politicians' failure to address climate change. The protest quickly swept over the world, mobilizing hundreds of thousands of young people, demanding political leaders to "listen to the science" (Fopp et al., 2021, p. 265), and to take meaningful climate action (Fisher, 2019; Otto et al., 2020).

The movement has since gained substantial media attention and support from a wide array of societal groups, including scientists, and it has sparked a debate on the application of climate science in policy (Fisher, 2019; Warren, 2019). While the core group of FFF includes school-level students and young adults, many associated groups have been founded, e.g., *Scientists for Future*, *Parents for Future* or (college-level) *Students for Future*, which all aim to further spread and strengthen the FFF message (Fopp et al., 2021; Koos and Lauth, 2020).

A major success of the movement has been to raise awareness about the immediate dangers of climate change. Furthermore, it has contributed to changing the narrative of the climate discourse in politics and in society overall and to mobilizing more and more young people to become involved in the democratic process (Fisher, 2019). Most importantly, FFF has amplified the voices of youth and children which had been seemingly marginalized in the climate debate in the past (Evensen, 2019). Therefore, the movement has become a key player in the global discourse and has pointed to the importance of addressing climate action in the school context.

2.3 The Importance of Climate Protection and Climate Awareness

Global warming and climate change are considered the most threatening and difficult problems for today's society. Sustainable development (SD) is a response to these unprecedented challenges and essentially calls to attention the frailty of the earth system, in which humankind operates (Bamberg et al., 2021). The World Commission on Environment and Development (WCED) first defined SD in 1987 in their report commonly known as *Brundtland Report* as a "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (WCED 1987, p. 41). As SD addresses and integrates fundamental aspects of human societies - economic development, social cohesion, climate and ecosystems, and challenges of global governance - it is inherently versatile and complex (Sachs, 2015).

Therefore, instead of addressing SD in its entirety, the thesis at hand focused on the overarching goal of climate protection (CP). CP serves as an umbrella term for issues regarding the mitigation of climate change and the

reduction of human impacts on the planet. For example, this includes the responsible and frugal use of resources, pursuing a modest lifestyle, or actively reducing CO_2 emissions.

But before any action is taken by individuals, there needs to be awareness for climate change and the issues involved. While the definition of climate awareness is somewhat ambiguous, it can generally be described as the cognitive processes, which influence the level of concern, understanding, attitudes, and interests for a certain issue (Deisenrieder et al., 2020). Essentially, climate awareness refers to how mindful and conscious individuals are and how much importance they attribute to something. To make this notion of climate awareness more palpable, this thesis focused on CP and actions taken towards it. In the research, it is investigated how CP is integrated and perceived in the school context and, by this, how climate awareness can be developed in the case of the German school system.

2.4 The Wide Range of Climate Protection Approaches at School

The thesis addressed CP in the context of the German school system. The following section introduces the range of existing approaches to integrate CP at schools throughout Germany and it shows that CP is becoming an increasingly important issue in the school context.

CP can be addressed at schools via different kinds of formats (Bundesumweltministerium (BMUV), 2018). It can be incorporated within lesson series covering relevant CP issues or as projects, which provide students and teachers with a unique, hands-on approach outside of the normal school routine. Further, there are more traditional, top-down approaches, such as environmental education programs or training sessions. Peer-to-peer-learning is another approach to CP and empowers students to become experts themselves and to reach out to their peers (Nachreiner et al., 2020). Another way of addressing CP is to take up business practices and to encourage students to found small-scale student companies (in German: “Schülerfirmen”) and, for example, take responsibility for small-scale power plants at their schools (Berlo et al., 2013).

There are also school-wide programs or broader concepts that frame and guide CP activities within one school, a city, or region. Examples of such programs are environmentally themed schools (in German: *Umweltschule*) or future-themed schools (in German: *Schule der Zukunft*), each of which stands for a specific set of climate-related criteria and activities (Langner, 2018a; Natur- und Umweltschutz-Akademie NRW (NUA), n.d.). In climate-themed contests, students have the opportunity to approach the topics in a more competitive way. This is the case, for example, in contests for more solar energy at school (in German: *Solarenergie macht Schule*) (Ittershagen, 2011), environmentally-themed writing contests, or the contest for outstanding actions against climate change (in German: *Blauer Kompass* (Lindenberger, 2020).

On a broader scale, there are programs in place to promote CP and, more holistically, SD among young people in particular. One of those programs is the *UNESCO Global Action Program on Education for Sustainable Development* (ESD). It focuses on providing political support for the efforts to introduce ESD as a new concept for learning and encourages a holistic transformation of schools to face the challenges of SD (Bundesministerium für Bildung und Forschung (BMBF), n.d.). Furthermore, it aims to enhance teachers' competences in terms of sustainable development and strengthen young adults.

There is a wide variety of topics that are addressed with the existing approaches. The most dominant topic in CP activities is energy, ranging from monitoring energy demand and energy savings, to using renewable or alternative sources of energy and to the energetic modernization of school buildings (Langner, 2018a). Other popular topics include food waste, packaging materials and recycling, resource conservation, or mobility (Langner, 2018a; Poetschke, 2019; Umweltbundesamt, 2018a, 2018b, 2018c, 2019).

Furthermore, there are projects and initiatives, which specify on the climate impact of schools as institutions. These projects aim to address and reduce the carbon footprint of a school (International Energy Agency (IEA), 2019). Examples are projects such as *Mit Energie gewinnen* in Düsseldorf, *Fifty / Fifty* in Hamburg, or *Energie gewinnt* in Wuppertal (Langner, 2018b). These types of projects are usually carried out by official bodies such as municipal governments and are meant to provide incentives for more conscious and sustainable use of resources (IEA 2019).

All of these activities, initiatives, and programs highlight the wide range of existing approaches to CP. In the analysis of CP in the school context, this thesis focused on two specific examples of such approaches and subsumed these under the term climate protection projects (CPPs). The two CPPs are *Schools4Future* (S4F) and *Energie gewinnt* (researcher's translation: "energy gains" (EG)) and are introduced in detail in section 4.1 (S4F, see also 1.2). Furthermore, the thesis aimed to incorporate and reflect the diversity and complexity of both CP approaches as well as the school system. Therefore, it applied a systems perspective and operationalized the MLP framework, as described in the following chapter.

3 Socio-Technical Transitions and the Multi-Level Perspective

3.1 The Socio-Technical Approach to Transitions

Due to the severity of the social and environmental problems associated with global warming, radical changes are needed (Köhler et al., 2019). But these radical changes require adequate conceptualizations and an understanding of the complexities at play. In light of this, several concept and frameworks have surged in the recent past, one of which is the socio-technical systems approach. This approach conceptualizes various socio-technical systems as part of society and prescribes a new role to technology and innovation in radical change processes (Smith et al., 2010). The approach describes change as major shifts in the system, or as socio-technical transitions (Geels et al., 2018). In the context of SD, they are also referred to as sustainability transitions (ibid).

The socio-technical approach combines insights from various scientific disciplines making it much more comprehensive than other approaches (Geels, 2012). In doing so, it expands on traditional interpretations of the causes of societal and environmental problems, for example, from neo-classical economics, psychology, ecology or political science and it highlights the multi-dimensional and co-evolutionary nature of systems and transitions (ibid). It rejects common views, which often describe change as a linear process and, by this, underestimate the complex mechanisms at play (Geels, 2012; Geels et al., 2018).

Key to understanding the socio-technical approach to transitions is the conceptualization of society as consisting of various socio-technical systems, each enabling and fulfilling societal functions, such as food, shelter, energy, or mobility (Geels, 2005; Geels et al., 2018). The socio-technical notion stems from the realization that technology is deeply entrenched in society, and vice versa, and therefore, it plays a key role in fulfilling societal functions (Geels, 2004). Innovations are closely linked to technology and they play another important role in the socio-technical approach. The premise is that innovation and radical novelties can create deep-structural change in the system and trigger transitions (Geels et al., 2018; van den Ende and Kemp, 1999). Examples of this can be found in historic technological breakthroughs, such as the use of steamships in international shipping (Geels, 2002), computer technology in the mid to late twentieth century (van den Ende and Kemp, 1999), or innovations and transitions in the energy sector (Geels et al., 2016; Verbong and Geels, 2007).

Frameworks and concepts have been developed already in the 1990's, which demonstrate that innovations, their diffusion, and a potential transition are not merely technological processes, but are driven by various social, economic, and political dynamics (Kemp 1994; Rip and Kemp 1998). They are contested processes based on complex interactions of actors, social structures, and institutions (Geels, 2012, 2002).

3.2 Sustainability Transitions in the School System

Sustainability transitions can also be considered in the context of the school system. Education is a basic societal function, which must be fulfilled by socio-technical systems, similar to providing food, shelter, or mobility. The school system can be conceptualized as the socio-technical system that enables the fulfillment of this function. It is a complex multi-actor system characterized by functional, political, and social-normative dimensions and it is defined through the interactions between the people and the existing structures (Kussau and Brüsemeister, 2007).

As explained in the previous chapter, schools are becoming places for change with an increasing presence of CP topics. The FFF movement has put a spotlight on schools and the responsibilities towards younger generations, by this, emphasizing the importance of including schools and their students in CP efforts. Moreover, education and the school system are new and emerging fields in the socio-technical transition research and only few studies from the most recent years exist that address sustainability transitions in the education context (Bamberg et al., 2021; Deleye et al., 2019; Gaddis and Jeon, 2020; Hamann et al., 2021; Hoinle et al., 2021; Meza et al., 2018; Mori and Tasaki, 2019; Otto et al., 2020).

All these considerations point to the need of addressing sustainability transitions in the school context. And, given the complexities at hand, the socio-technical approach provides an intriguing concept to be applied to the school system. While the process of transitions can only be studied over time, this thesis applied the socio-technical approach to conduct an analysis of the school system at its current point in time and aimed to identify key factors that play a role in a potential transition towards more climate awareness.

3.3 The Multi-Level Perspective as an Analytical Framework

The *multi-level perspective* (MLP) has been developed as a way to make sense of transitions. Since its introduction in the early 2000's, it has become a prominent approach to study sustainability transitions. It is innovative not least because of its interdisciplinary origins and because it integrates lessons from evolutionary economics, sociology of technology, and neo-institutional theory (Geels, 2012). While the MLP is not a ready-to-use methodology, it adequately addresses the uncertainties and ambiguities of socio-technical transitions and serves as "a heuristic device for framing the complexities of change" (Fudge et al., 2016, p. 5). Hereby, the terminology of socio-technical systems provides a "language" (Smith et al., 2010, p. 442) for organizing a vast array of factors and dynamics. The main premise of the MLP is that innovation, which has been developed in a protected space, can trigger transitions through the interplay of different elements at multiple levels (Geels, 2012).

Much of the existing knowledge stems from the environmental sciences, especially with regard to energy-related topics. Other disciplines associated with the MLP are the social sciences and economics and topics addressed are diverse such as urban planning, mobility, or tourism. But the research on the topic and the body of knowledge continues to grow. While the MLP has been applied to various technological aspects of sustainability transitions, there remains a need to address innovations in social practices as well (Schneidewind and Scheck, 2013). In light of this and of the urgency for SD, several scholars put emphasis on social innovations, with some also addressing the gap of knowledge on transitions in the context of schools and education (Arocena and Sutz, 2021; Deleye et al., 2019; Hoinle et al., 2021; Hölsgens et al., 2018; Mori and Tasaki, 2019). Similarly, the research at hand addressed this gap of knowledge of the school system and focused on qualitative socio-institutional factors.

The MLP provides a valuable framework for this. It does so by centering around three analytical levels - niche, regime, and landscape - and on three main elements - actors, technological artifacts and infrastructure, and institutions. The interplay between those elements and levels, as shown in Figure 1, define the overall socio-technical system (Geels, 2012). The MLP proposes that innovation is developed at the smallest analytical level, the niche, by small networks of actors. These actors interact with each other and with technology and infrastructure according to institutions - or sets of rules[1] (such can be values, practices, laws, patterns, see also Table 1) - to create innovation. The goal for niche-innovations is to build up internal momentum, to break through into the regime level, and to challenge the existing established structures in the regime. The regime, in turn, is shaped, maintained, and stabilized by different rules, by other and stronger networks of actors, and by different use of and interactions with existing technologies and infrastructure.[2] In addition to the pressures from niche-innovations, there is pressure on the regime from the exogenous landscape level, albeit it can also be a stabilizing force. This landscape refers to the broad societal context and factors which are slow to change, e.g., climate conditions, social movements, or deeply rooted cultural beliefs. Eventually, depending on the dynamics between all these aspects, the socio-technical regime becomes destabilized making way for change of the socio-technical system.

[1] Geels and other scholars (Geels, 2004; Geels and Schot, 2007; Raven and Verbong, 2007) have pointed out the ambiguity of using the term *institutions* as it is easily misinterpreted to mean public organizations. The thesis at hand followed this line of argument and utilized the more direct and literal term *rules*.

[2] The use of the term *regime* in the transition literature reveals some inconsistencies, with most notable differences in terms of interpreting regime (only) as a *rule set* or as a *system* (Markard and Truffer, 2008). Nevertheless, in this thesis, the key elements actors, institutions, and technologies and infrastructure were conceived to exist at the meso-level, the regime level, as well.

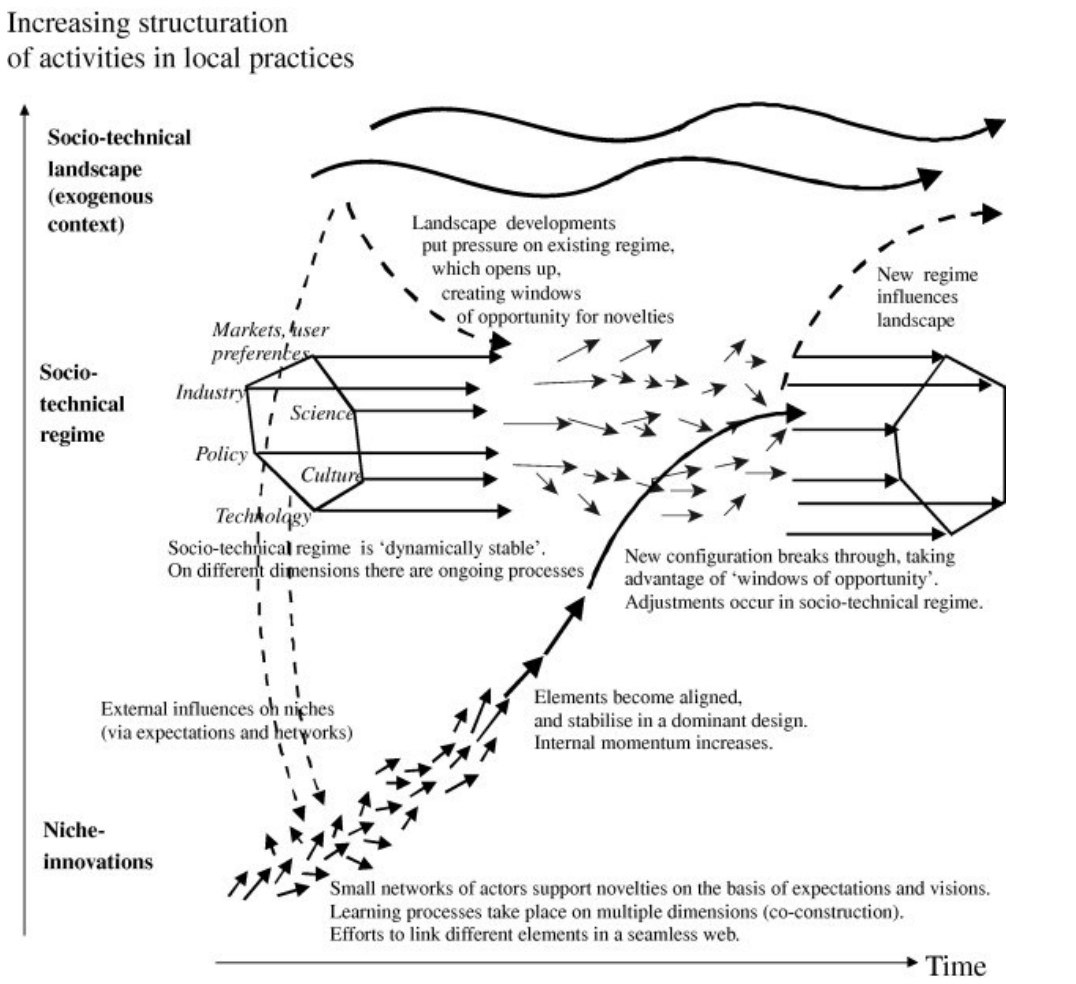

Figure 1: Multi-level perspective on transitions (Geels, 2012, p. 474).

The key elements (actors, technological artifacts and infrastructure, and rules) exist both on regime and on niche level, but they vary in the degree of stability (Geels, 2012; Geels and Kemp, 2007). This similarity in structure emphasizes that the levels can be seen as a nested hierarchy with niches existing inside or outside regimes and regimes being embedded within the landscape (see Figure 2) (Geels, 2012).

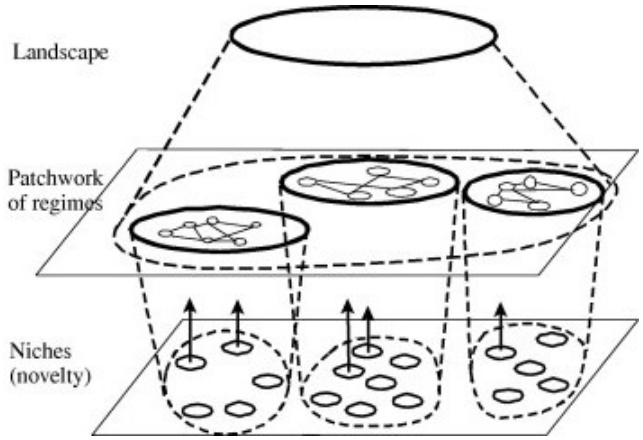

Figure 2: Nested hierarchy (Geels, 2012, p. 473).

This hierarchy is evident when comparing the configurations at each level. Corresponding to small networks of actors and the novelty of an innovation, the niche is defined by a small degree of stability; actors follow their unique patterns and rules, and activities are characterized by experimentation and novelty. The regime level holds more stable configurations with actors, interactions, and activities more formalized and coordinated. At the landscape level, arrangements are very stable, slow to change, and beyond the actors' direct influence. By this logic, the higher the analytical levels progress, the more stable and formalized the configurations become.

This brief and ideal-typical description of the processes within the MLP framework highlights the complex dynamics at play. It shows that innovation and transitions are not in any way linear processes or follow single causality, but instead are shaped by multiple developments and the co-evolution of various aspects. Examples of such developments include co-evolution, innovation cascades, knock-on effects, or hype-disappointment cycles, each of which correspond with different outcomes and effects on the regime (Geels, 2012). By incorporating this, the MLP depicts the constant struggle between stability and change: on the one hand, lock-ins, path dependencies, and resistance and, on the other, alignments and windows of opportunity. The following subchapters elaborate on the different elements and analytical levels of the MLP.

3.4 The Elements of Socio-Technical Systems

3.4.1 The Actor Concept

Actors can be characterized and structured through various schools of thought. The transition literature employs, amongst others, the neo-institutional theoretical approach to actor structuring (Geels, 2012). The actor concept refers to the organized actors represented and interacting in the socio-technical system. Figure 3 shows the complex dynamics and structures in which actors operate. Actors interact with each other, utilize resources, and constantly create and follow social rules and practices (Scott, 2014). In doing so, actors are knowledgeable, reflexive, and capable of understanding and their activities are further influenced by unique sets of values and mindsets (Geels, 2004). This points to the fact that actors can make active decisions and take actions. They interpret and assess their surroundings and are capable of strategically engaging, acting, and contributing towards change (Geels and Schot, 2007; Scott, 2014).

Furthermore, actors are part of a social system and are influenced by each other through cultural frames, conditions, laws, and norms. They are constantly involved in the production and reproduction of the existing social structures, making these structures both the product of and the platform for social actions (Scott, 2014). But these same social structures are also source for constraints and actors are in constant struggle between freedom, agency, and opportunities, on the one hand, and limitations and restrictions, on the other (Scott, 2014).

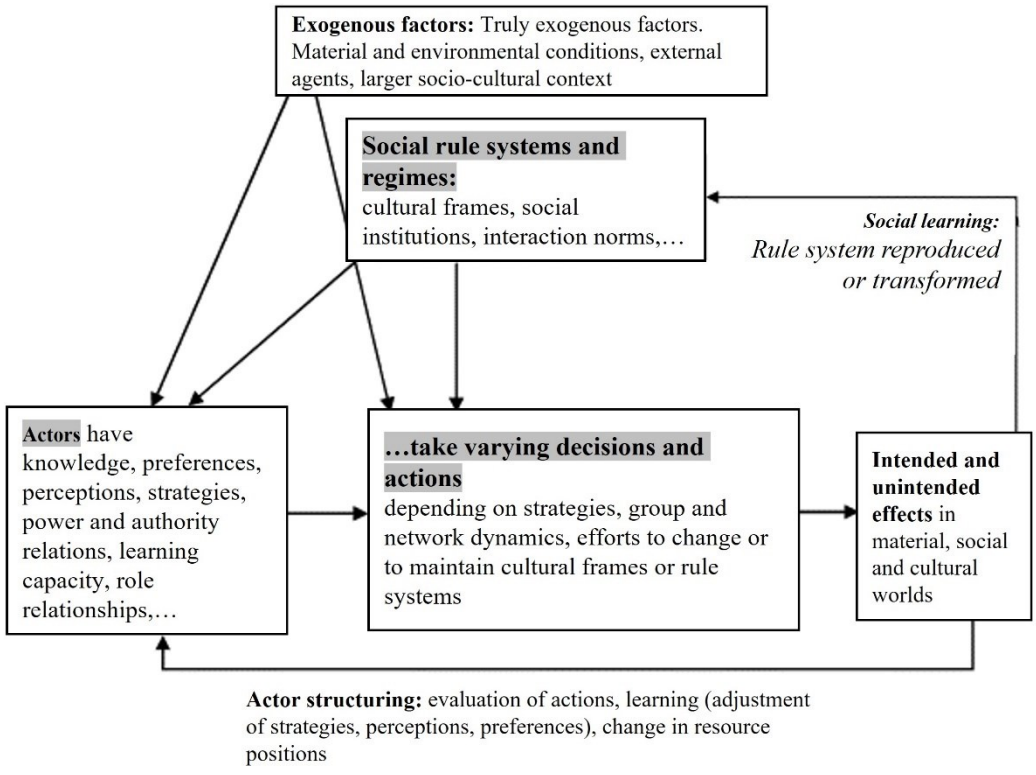

Figure 3: Actor-rule system dynamics (adapted from Geels, 2004, p. 908).

The actor concept in socio-technical systems highlights the complexity involved with transitions by underlining that actors are inherently connected and embedded within the rules, artifacts, and networks of the system (Geels, 2004; Raven and Verbong, 2007).

As mentioned above, the MLP suggests a hierarchy between its analytical levels in the form of varying degrees of stability of configurations. This also applies to the actors in the system. This means that actors can be characterized as niche or regime level[3] actors depending on the degree to which they are coordinated and structured. Accordingly, actors at regime level play an important part in carrying out, adhering to, and reproducing existing and predominant rules practices and are, therefore, stabilizing the regime. Niche actors, on the other hand, correspond to less stability but to novelty and experimentation. This sense of novelty and unique configuration can become key when it comes to developing niche-innovations and promoting certain ideas and or networks (Bauknecht et al., 2015).

3.4.2 The Rules Concept

The concept of rules represents the underlying logic or "grammar" (Rip and Kemp, 1998, p. 338) of socio-technical systems. By combining a variety of aspects and dimensions, this concept provides a structuring quality to the complex nature of socio-technical systems. In essence, rules represent different structures, practices, or values; they can be formal, informal, explicit, invisible, or presumed. Examples include common practices, beliefs, values, laws, or standards. Rules are all-encompassing, coordinate activities and interactions, and are deeply embedded in artifacts and infrastructure (Geels, 2004). There are different dimensions of rules which are important to distinguish: the regulative, cognitive, and normative rule dimension. Table 1 and the following paragraphs further elaborate on what these dimensions entail.

The regulative dimension of rules refers to formal and explicit rules. This dimension is very straightforward because it entails what many people would intuitively consider to be rules. Important for the regulative rule dimension is that the content of rules is specific und unambiguous and there is a clear incentive to follow these rules; disobeying regulative rules can be sanctioned by an official authority, such as courts or the police (Geels, 2004; Scott, 2014). Regulative rules include government regulations, standards, procedures, laws, and the legal system (Geels and Schot, 2007). Furthermore, these formal rules apply to various areas of society such as contract laws, property rights, tax structures, regulations for technologies, emission norms, or subsidy programs (Geels, 2004). In a wider sense, these explicit and formal rules can also refer to scientific research programs and

[3] Because the landscape level refers to highly stable configurations and tends to include factors that are broader and beyond actors' influence, the actor configurations are less conclusive at this level.

rules for grants or coordinate cultural aspects, such as rules which structure the spread of information (e.g., media laws) (ibid). The formal notion points to the fact that rules have the power to regularize people and their activities (Scott, 2014). This is conducted through coercion (i.e., by authority) (Geels, 2004). However, regulative rules cannot only be restrictive, but they can also give incentives and empower or enable certain activities, e.g., increased profits for private companies or tax benefits (Scott, 2014).

	Regulative	**Cognitive**	**Normative**
Basis of Compliance	Expediency	Shared understanding, taken-for-granted	Social obligation
Basis of Order	Regulative rules	Constitutive schema	Binding expectations
Mechanisms	Coercive, mandatory / compulsory	Imitative, learning	Normative pressures, social sanctions
Basis of Legitimacy	Legally sanctioned	Recognizable, culturally supported	Morally governed

Table 1: Three dimensions of rules (adapted from Geels, 2004, p. 905 and Scott 2014, p. 60).

Cognitive rules, as the term suggests, refer to the cognition of actors in a socio-technical system. These rules are the "frames through which meaning is made" (Scott, 2014, p. 67). Frames, in turn, are the individual schemes and patterns of interpretation (Benford and Snow, 2000). Cognitive rules encompass a variety of examples: mindsets and worldviews, beliefs, paradigms, (guiding) principles, agendas, priorities, problem definitions and problem solving strategies (heuristics), underlying and implicit knowledge, symbols (such as words, concepts, myths, signs, gestures), interpretations, and goals (Geels, 2004; Geels et al., 2018; Geels and Schot, 2007; Scott, 2014). All of these different notions rely on active processes where a person's intellect and intuition come into play (Schlitz et al., 2010). Moreover, actors use cognition to interpret their surroundings, attribute meaning, understand causalities, become aware, comprehend complexities, or develop visions and solutions (Geels et al., 2018; Scott, 2014). Therefore, cognitive rules imply agency (Benford and Snow, 2000). Scott (2014) further emphasized the cultural aspect of cognitive rules, terming them cultural-cognitive. This points to the fact that people tend to share frames, definitions, assumptions, or ideologies within a specific cultural context.

Normative rules focus on moral aspects of society. In essence, they include values and social norms that are present in socio-technical systems and applied through the underlying morals of society (Geels, 2004). Values represent people's ideas about what they prefer or desire and there are principles in place to assess whether actions conform to these ideas or not. This makes normative rules inherently appraising (Scott, 2014). Furthermore, social and also behavioral norms dictate what is expected of members of society. This refers, for example, to role expectations, responsibilities, duties, or

rights, all of which include ideas of what appropriate actions or goals of someone fulfilling a certain role should be (Geels and Schot, 2007). Thereby, these prescribed ideas entail normative expectations of how certain actors are "supposed to behave" (Scott, 2014, p. 64) and how things should be done (Geels, 2004; Scott, 2014). Normative rules can also refer to role relationships between different actors and define authority systems or hierarchies (Geels and Schot, 2007). Taken together, the existence of normative rules highlights those various actors are subject to external pressures and there is a constant struggle to comply with these rules. This means that no actor is entirely free, but is always under external influences which, in turn, shape his or her actions (Scott, 2014). Contrasting to regulative rules, normative rules are enacted upon and eventually internalized not through force, but through socialization (Geels, 2004).

3.4.3 Technological Artifacts and Infrastructure

The MLP views technology as deeply embedded in society and as playing a key role in fulfilling societal functions; often, technology is at the heart of niche-innovation. Technology itself can be described in a straightforward way: it refers to the tangible objects, or artifacts, which actors handle, apply, and reproduce (Geels, 2004). Technological artifacts can be things, products, hardware, power plants, energy grids, vehicles, but also more broad technological developments such as computers or information and communications technology (Best, 2019). These artifacts are the instruments that actors use to fulfill a function, e.g., using a telephone to communicate with others or using public transportation to commute to work.

Furthermore, the notion of technology also includes more general aspects of the same, such as infrastructure or buildings (e.g., road infrastructure: streets, traffic lights, bridges, tunnels) (Geels, 2012). In the school context, technological artifacts and infrastructure refer to school buildings and energy. The different places at school also play a role as they are part of the infrastructure the school provides, e.g., the school campus, cafeteria, technical equipment, school buses, cars, or bikes as modes of transportation.

When considering technological artifacts and infrastructure, it is important to remember that rules are all-encompassing and, by this, rules coordinate and structure interactions with existing artifacts and infrastructure. In the present research, with the key objectives in mind, these tangible elements were considered as secondary and less significant. Instead, the focus on rules and interactions highlights that of technological artifacts and infrastructure indirectly reveal the ways, in which the rules are expressed.

3.5 The Analytical Levels of the Multi-Level Perspective

3.5.1 The Regime Level

At the core of the MLP lies the socio-technical regime. It represents the conceptual center of the framework and the established and dominant structures (Bauknecht et al., 2015; Markard and Truffer, 2008). Recalling the purpose of socio-technical systems - to fulfill key societal functions - the regime can be considered the established methods, in which these functions are fulfilled.

The socio-technical regime consists of a very stable configuration of actors, technological artifacts and infrastructure, and rules (Raven and Verbong, 2007). Actors coordinate their activities in strong and stable networks and there are coherent sets of rules structuring the development and application of technologies. These dynamics highlight the fact that the regime is created and maintained through interconnected actors, their activities with artifacts, and the underlying guiding rules (Bauknecht et al., 2015; Markard and Truffer, 2008). This dominant logic and the high degree of coordination and alignment create mutual dependencies and stability for the regime. Examples of such stabilizing forces are the dominance of certain technologies and practices, deep-set ways of thinking, legally binding contracts, routines, social relationships and role expectations, vested interests, or sunk investments (Geels and Kemp, 2007). Because of this innate logic, the regime cannot be easily changed or altered.

In the school context, the regime level is represented by the established school system (as other studies have proposed in similar contexts ((Hamann et al., 2021; Hoinle et al., 2021)). The school system was put in place in order to fulfill the function of education within a society. Furthermore, schools are institutions that operate within a political-administrative logic and are highly connected to public policy (Hoinle et al., 2021; Kussau and Brüsemeister, 2007).

3.5.2 The Niche Level

The niche level represents the smallest analytical level of the MLP. It plays a crucial role in the approach to transitions by providing the protected space, in which niche-innovations develop. This protected space, also referred to as incubator, stepping stone, or space for nurturing, is separated from the established socio-technical regime (Geels, 2005; Geels and Schot, 2007; Raven, 2007). It provides protection and independence from dominant pressures and structures of the regime, e.g., being shielded from market forces, competitors, certain regulations or requirements (Bauknecht et al., 2015; Geels and Schot, 2007). Niche activities are, instead, driven by a small number of highly motivated, enthusiastic, outside actors with unique sets of rules and structures. The logic of the niche deviates from the regime logic and is characterized by open processes of experimentation and learning (Geels, 2012). While niches also consist of actors, rules, and

technological artifacts and infrastructure, their configurations are much less stable. There are irregularities and uncertainties and rules can be unclear, diffuse, or not shared among all niche actors (Geels, 2005; Markard and Truffer, 2008). This makes it even more important for niche actors to build networks, foster learning processes, and align elements, so that internal momentum increases (Geels, 2012). Eventually, the goal is to break through and destabilize the regime.

A niche is not necessarily an individual project or experiment. While niches exhibit irregularities and low stability, they already do represent a certain level of aggregation of projects, initiatives, and actors (Bauknecht et al., 2015). This means that for the context of this present research, CPPs were considered one example of activity *within* a niche. On a more aggregated level, the niche is conceptualized as the novel configuration of actors and activities that seek to integrate CP in the school context with the overall goal to trigger a transition towards more climate awareness. The niche includes those actors "who pioneer innovations" (Bamberg et al., 2021, p. 2), who are involved with CPPs, and call for climate action and new regulations.

3.5.3 The Landscape Level

The landscape level in the MLP is a more abstract concept. It describes the exogenous, external factors that influence regime and niche (Geels and Schot, 2007). However, actors and rules at regime and niche level have no direct influence on the socio-technical landscape surrounding them. The landscape sets the context, or the environment, and accounts for the residual factors in the system.

While landscape can be interpreted literally into physical geography, climate conditions, or urban layouts of human settlements, it can also mean deep-set cultural beliefs, political ideologies, economic systems, or the media landscape (Geels, 2012; Geels et al., 2018; Geels and Schot, 2007). Another defining characteristic of the landscape level is its slow-changing nature. It can be conceived as the "background variables" (Markard and Truffer, 2008, p. 606) that in itself is independent and stable, or only slowly changing.

The landscape level was important for the research at hand because it provides the context, in which socio-technical systems exist, and it indicates that there may be factors at play that are stable, independent, and cannot easily be transformed.

4 Methods

4.1 Scope of the Research

The goal of this research was to address the role of the schools in society and to analyze the processes and elements related to a potential transition towards more climate awareness in the school system. This was done by studying how CP is incorporated in the school system and by focusing on different actors involved in coordinated CP activities at or involving schools, referred to as climate protection projects (CPPs). Emphasis was put on the notion of climate awareness and on the actors' experiences and perceptions surrounding it. To this end, the MLP framework was operationalized. Recapitulated from section 1.3, the following research question and two sub-questions were addressed in this thesis:

RQ: How do actors in climate protection projects perceive drivers and barriers for transitioning towards more climate awareness in the German school system?

SQ1: What are the rules that constitute the school system and that are associated with the integration of CP

SQ2: Who are the relevant actors in the school system and how do they interact with each other?

In the context of this research, the regime level was defined as the established school system. This refers to the dominant logic and established practices that actors reported. It is important to note that the scope of the regime level also entails stabilizing forces and a logic to follow rules, which are not questioned. The school as a whole was considered in the scope of the regime, meaning that the institution is part of the dominant political-administrative system and highly connected to public policy.

The scope of the niche focused on the school in a smaller context and the niche level was defined as the people who bring forth and create innovation and actors who call for climate action and new regulations (Bamberg et al., 2021). This refers to the actors involved in CPPs and engaging with CP-related topics. Niche activities were defined as those activities that seek to raise climate awareness and to integrate CP in the school context. Furthermore, the niche refers to activities, actors, or situations, which are concerned or connected with a potential transition of the school system altogether. As mentioned in section 3.5.2, the niche level can incorporate more than individual projects. Therefore, CPPs represented one part of a niche to raise climate awareness and they were analyzed as one example in this research.

For the thesis at hand, CPPs were defined as coordinated activities addressing climate change and CP. They refer to activities that are carried out in a structured, organized, and collective manner. Hereby, the focus lied on the projects S4F and *Energie gewinnt* (EG). The research did not aim for a detailed comparison between the two. Instead, S4F and EG provided fitting

examples of CPPs and the overall integration of CP into schools in Wuppertal and were examined together and complementary to one another.

As introduced section 1.2, S4F addresses the significant GHG emissions reduction potential at schools with the goal of making schools, as part of the public building stock, climate neutral. The project focuses on raising awareness about GHG emissions in school operations, assessing the carbon footprint as well as implementing targeted emission reduction measures. It focuses on several school areas where emissions are evident and substantial. Those are building energy and renewables (electricity, thermal energy, and warm water consumption), mobility as well as cafeteria and procurement (mainly, paper supply).

EG, on the other hand, has a particular focus on energy. The project is based on the *50:50*-concept of refunding 50 percent of the energy costs (regarding use of resources in electricity, thermal energy, and water consumption) that a school has saved over the course of one year (Stadt Wuppertal a, n.d.). It is carried out by the municipal building management of Wuppertal (in German: Gebäudemanagement Wuppertal (GMW)) as the proprietor of the school infrastructure. Like many *50:50*-based projects, it is directed at the level of user behavior and encourages the implementation of small and practical energy-saving measures (IEA 2019). In doing so, it aims to raise awareness and achieve more energy-conscious behavior. EG is structured into two elements: one essentially regards the energy savings (*50:50*-based), the other is a contest on implemented educational climate actions, which were introduced to broaden the impact of the project (Stadt Wuppertal b, n.d.). Both are awarded with prize money.

4.2 Methods for Data Collection

4.2.1 Expert Interviews

The data for this research were collected by conducting qualitative expert interviews with actors involved in CPPs. This was deemed appropriate given the goal to provide insights into individual perspectives and perceptions of how CP is integrated in the school system.

A key focus for the data collection process lied on *perceptions*, as is also reflected in the research question. For this, first-hand, individual, and subjective perspectives were considered to be most insightful. Furthermore, the conceptualization of the school system as a socio-technical system and the associated niche activities (CPPs) represent novel developments in the field of transition studies. Therefore, it was assumed that insights into unique examples can be beneficial and qualitative focused approaches to research are useful. Qualitative interviews provide a suitable tool for this as they generate and structure knowledge that is specific to a case at hand and that is typically not available to everyone (Goldberg and Hildebrandt, 2020).

Interviews are often used as a research method in the social sciences and are designed to be deliberate and well thought out exchanges between the researcher and selected interview partners (Reichertz, 2016). Through these focused interactions and the subsequent detailed analysis, new insights and knowledge are made accessible and useful for addressing and explaining certain phenomena and research interests (Gläser and Laudel, 2010). Hereby, it is important to remember that interviews are, above all, human interactions and are based on the subjective knowledge and interpretation of the interviewee (Reichertz, 2016). This means that the selection of appropriate interview partners and the careful preparation by the researcher is a significant step.

For the research at hand, the selection process was based on identifying *experts* with knowledge of the specific context (Gläser and Laudel, 2010). In general, there is no standardization of what constitutes expert knowledge and the status of being an expert is a fluid one and attributed by the researcher, not by the experts themselves (Goldberg and Hildebrandt, 2020; Strübing, 2013). In the case at hand, experts, referred to individuals with knowledge, experience, and access to the school system and to CPPs in particular. Hence, the chosen interview partners were individuals with an understanding of the specific topic and circumstances and who are able to explain, justify, confirm, or deny certain developments and aspects related to the topic (Goldberg and Hildebrandt, 2020).

4.2.2 Case Selection

The selection process was further based on a set of predetermined criteria. Interview partners were chosen who have:

- An immediate professional connection to the school context,
- Familiarity with and in-depth knowledge of the German federal education system,
- Expertise in the context of CP in school or specific links to the main CPPs of this thesis (EG and S4F), and
- Knowledge of the network of actors involved.

The interview partners were structured into one of the following four actor groups, which were developed based on initial research of the German school system (Edelstein, 2013; Hepp, 2013):

- **Political-administrative actors** (ADM), which hold administrative positions related to the education context within the political system,
- **Network partners and interest group actors** (IG), which represent private organizations or research institutions and are partners for schools and municipalities in conceptualizing and implementing CPPs,
- **Students** (STU), which are involved in CPP activities and represent school actors, and
- **Teachers** (TE), which are involved in CPP activities and represent school actors.

The focus of the original research design had been a specific region, namely, the German constituent state of North Rhine-Westphalia (NRW). While many of the selected interview partners are associated with activities in NRW, the regional limitation was expanded to also include special interest groups and network actors outside of NRW. These were incorporated because of their long-term experience with CPPs throughout Germany and their consolidating role for nationwide interest groups.
The interviews were planned as personal, face-to-face interviews but were eventually conducted via video calls. This was a step taken due to the COVID-19-pandemic and the corresponding public health measures.

In total, eleven experts were selected for the interviews. The interviews were carried out in June and July of 2021. The time frame for each interview was 30 to 60 minutes. Table 2 shows a detailed overview of the selection of the final eleven interview partners (IP).

No.	Assigned Actor Group	Token	Location	Organization	Responsibilities / Competences of IP	Interview Date	Approx. Length
1	Political-administrative (ADM)	ADM1	Wuppertal NRW	Municipal building management (GMW)	Person responsible for EG at municipal level	18.06.2021	60 min
2	Political-administrative (ADM)	ADM2	Arnsberg NRW	District government, Division for School, Culture, Sports	Department for secondary schools and subject supervisions (amongst others) Cross-departmental working group on ESD Member of the S4F advisory board	22.06.2021	60 min
3	Political-administrative (ADM)	ADM3	Wuppertal NRW	Municipal Department of Social Affairs, Youth, School, and Integration	Head of department managing school authority, school supervisory body, and the school infrastructure	15.07.2021	30 min
4	Network partners / Interest group (IG)	IG1	Bochum NRW	zdi networks IST.Bochum	State coordinator (on behalf of MSB) for zdi networks Consultant for STEM education Director of studies at public school	24.06.2021 and 28.06.2021	70 min (combined)
5	Network partners / Interest group (IG)	IG2	Berlin Berlin	Independent Institute for Environmental Issues (UfU)	Co-director, head of energy department, project manager Person responsible for Fifty/Fifty	24.06.2021	55 min
6	Network partners / Interest group (IG)	IG3	Heidelberg Baden-Württemberg	Institute for Energy and Environment Research (ifeu) & BUSEB	Co-director and head of energy and environment department Focus (amongst others) on CPPs at schools Chairman of federal association School - Energy - Education (BUSEB)	02.07.2021	55 min
7	Student (STU)	STU1	Wuppertal NRW	Public school B	Upper grade level student, active in S4F	17.06.2021	30 min
8	Student (STU)	STU2	Wuppertal NRW	Public school B	Upper grade level student, active in S4F	23.06.2021	55 min
9	Teacher (TE)	TE1	Wuppertal NRW	Public school A	Teacher and person responsible for CPPs (EG and S4F)	08.06.2021	55 min
10	Teacher (TE)	TE2	Wuppertal NRW	Public school B	Teacher and person responsible for CPPs (EG and S4F)	17.06.2021	50 min
11	Teacher (TE)	TE3	Wuppertal NRW	Public school C	Teacher and person responsible for CPP-S4F (school takes part in both EG and S4F)	23.06.2021	40 min

Table 2: Detailed description of the selected interview partners.

The interview partners were chosen to represent a range of relevant actors in CPPs and the niche that was analyzed in this research. The examples of CPPs (S4F and EG) guided and framed the choice for the schools that were to be interviewed, i.e., schools were selected based on their participation in both projects. S4F was chosen because of the association of this thesis with the project; further, EG was included to reflect the context of Wuppertal and was of particular interest for S4F project team.

The focus on the German public school system meant that the political system and administration, of which the school system is part, needed to be reflected in the data collection process. Outside partners (network partners and interest group actors) were included in the interviews because CPPs are often implemented with the help of these outside actors, which suggested that they could provide meaningful insights. The motives for not interviewing members of the S4F project team (e.g., as a counterpart to the IP from EG project team) were the close association of the research with the project itself and to avoid potential biases. Instead, other outside partners were selected to incorporate new and potentially different perspectives and experiences.

In the ongoing data collection process, it was thought to be insightful to include further perspectives, especially from further school and political-administrative actors. Three further experts and potential interview partners were contacted, however, without success. It was assumed that the timing of the research and the ongoing COVID-19-pandemic made the research process more difficult, and these actors in particular were strained by the situation and difficult to contact. However, the data collected up to that point were plentiful and the scope of eleven interviews was deemed sufficient.

4.2.3 Interview Guidelines

The expert interviews conducted for this thesis intended to capture the individual knowledge, experiences, and perceptions of each of the interview partners. Semi-structured guidelines were developed for the interviews to find a balance between obtaining the necessary insights and offering flexibility and openness. To ensure contextuality and relevance throughout the interview, each question was reflected upon with respect to its meaning and intention (Przyborski and Wohlrab-Sahr, 2014).

In line with Goldberg and Hildebrandt (2020), the guidelines for the interviews were based on three types of questions: main questions, follow-ups, and probes. Main questions signaled a new, broader topic and were oriented along the main research question and the two sub-questions. Follow-up questions built on the previously asked main question and were used to give the interview partner the opportunity to offer more detail and specific information. Many of follow-up questions were included in the guidelines beforehand, but some were developed spontaneously during the interview.

Probes were included in the guidelines as a reference for the researcher and served as reminders or for redirecting the interview back to topic if it had digressed.

The experts chosen for the interviews represented different actor groups and a specific interview guideline was developed for each actor group. Corresponding to the research question and the sub-questions, all of the guidelines reflected three major topics: climate protection and activities (in German: “Klimaschutz + Aktivitäten”), cooperation and networks (in German: “Kooperation + Netzwerke”), and (future) school development (in German: “Schulentwicklung + Transition”). Within these topics, questions could vary to a small degree and could be adapted to the specific actor group. Between two and four main questions were included in one guideline with one or two prepared follow-ups each. The detailed interview guidelines are included in the appendix of the thesis (see Appendix I).

The interviews were conducted in German as the research was focused on the school system in Germany and local experts. Furthermore, German was selected as a language to ensure that the interview partners would feel comfortable and could express themselves in their native language.

4.2.4 Documentation Process

In total, eleven interviews were conducted for the research. All of the interviews were recorded as audio and video data. A written declaration of consent for the recording, the subsequent transcription and analysis of the interviews was given by each of the interview partners. The audio recordings were used to transcribe the interviews in full using a transcription and analysis software (MAXQDA). The video recordings were used only to clarify and complement some of the interviews’ sequences when audio was difficult to comprehend. Because they were not essential for the later analysis, the video recordings were deleted after the transcription of the data was completed.

The guidelines for the transcription of the data had been determined beforehand. Because there are no standardized sets of rules, the following aspects were deemed to be most important for the transcription process. Firstly, the focus of the analysis lied on the contents of what the experts said and the messages they brought across (as opposed to a linguistical analysis, e.g.), and it was appropriate to smooth out the material to a some degree (Strübing, 2013). This refers to smoothing out certain dialect or slang and to employing standardized and correct orthography (Gläser and Laudel, 2010). Secondly, in accordance with Strübing (2013), each paragraph of transcribed text received a clear reference. Thirdly, abbreviations were used to signal the person speaking (either the researcher or the interview partner) and shorthand symbols were employed for pauses, essential non-verbal communication, and incomprehensible portions of dialogue. Lastly, essential non-verbal communication, such as nodding, laughter or hesitation,

was only included in the transcription when it emphasized or changed the meaning of the interviewee's statement (Gläser and Laudel, 2010).

4.3 Methods for Data Analysis

4.3.1 Qualitative Content Analysis

The approach of analyzing the collected data was a qualitative content analysis based on Kuckartz' framework for a content-structuring qualitative analysis (2018); an approach which also includes elements of Mayring's content analysis (2010) This method was chosen because of its potential to systematically extract from and reduce the wealth of data and information without compromising the given and necessary complexities (Gläser and Laudel, 2010).

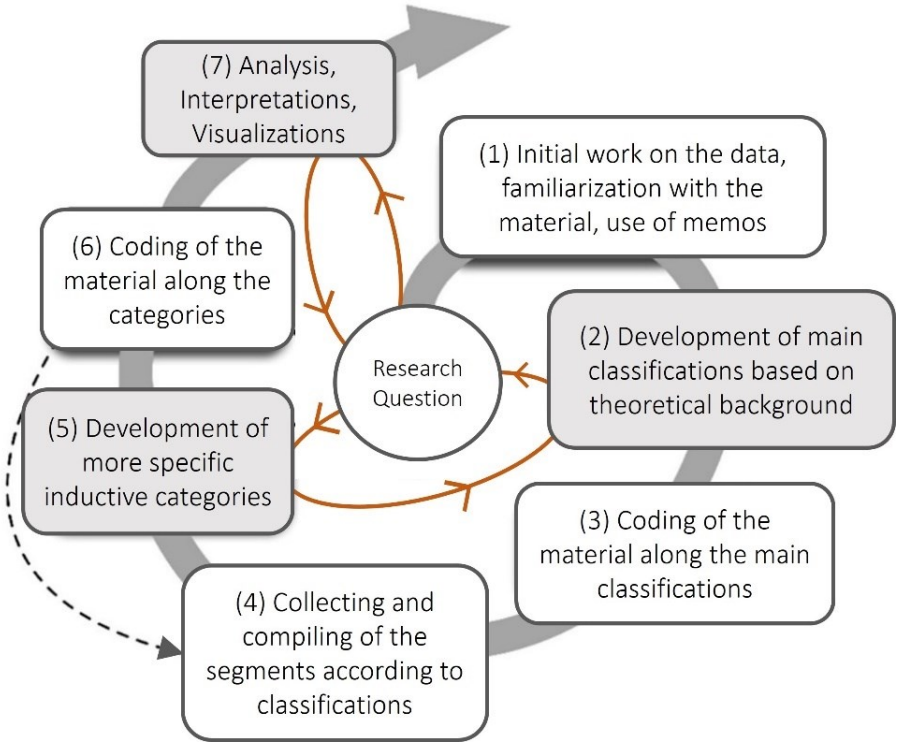

Figure 4: Process of a content-structuring qualitative analysis (adapted from Kuckartz, 2018, p. 100).

Figure 4 shows the steps that were taken in the content-structuring qualitative analysis. The initial work on the data included familiarizing with and preparing the material (1). Then, the main classifications were developed according to the theoretical backgrounds that had been established in an earlier step in the research (2). Accordingly, the material was coded along these main classifications (3) and the classified segments were collected and organized (4). For these first four steps, the data analysis software (MAXQDA) was used. The fifth step included the development of more specific, inductive categories based on the collected data (5) and the material was coded along these categories as well (6). At last, the data were

interpreted and structured to extract the results of the research (7). These three steps were carried out using the Microsoft Excel software.

As indicated in Figure 4, steps 2, 5, and 7 are closest related to the research questions; hence, it was important to continuously review the objectives of the research and analyze the data accordingly. The arrow linking steps 6 and 4 indicates regular revisions and corrections, if necessary. The main steps of the qualitative content analysis (highlighted in gray) are described in more detail in the following sections.

4.3.2 Deductive and Inductive Coding Processes

Following the first step of the qualitative content analysis (the initial work on the material[4]), different techniques were considered for the coding process; namely, deductive and inductive coding techniques (Kuckartz, 2018). The deductive or *a priori* coding technique is oriented towards developing categories independent from the collected data and preceding the actual process of analysis. By using the inductive technique, on the other hand, categories are developed directly in line with and based on the data. Because these approaches do not necessarily exclude one another, a combination of the two is often applied in research (Kuckartz, 2018).

Referring to the steps outlined above, the development of deductive classifications corresponded to step 2. This task was fulfilled with the help of the theoretical backgrounds on socio-technical transitions and the MLP established in chapter 3. Here, the main goal was to structure the material in terms of the MLP framework and its terminology at an early stage. Accordingly, the following five classifications were developed and used to code all of the relevant interview material (step 3):

- Actors
- (Inter)actions
- Rules
- Landscape Factors
- Technological Artifacts / Infrastructure

Table 3 shows in more detail how the classifications were defined.

[4] This included a systematic reading of the interview manuscripts and scanning them for relevance, i.e., excluding topic digressions or the remarks about of technical problems from the analysis.

Deductive Classifications:	Definition:
ACTORS	▪ References to the people and organizations involved and that indicate in what capacity or responsibility ▪ References that stand out particularly about those actors (i.e., personality, motivation)
(INTER)ACTIONS	
Actor-Relationships	▪ References that describe the relationship between actors, incl., the nature of interactions ▪ References that indicate whether relationships or interactions are generally positive or generally negative
Activities	▪ References that describe concrete activities in the general context of CP and/or specifically regarding the CPP that have been or will be implemented ▪ References that indicate whether activities are running generally positively or generally negatively
RULES	
Regime Level Rules	▪ References to aspects and conditions that are perceived as structural and prevalent in the school system and that are perceived to stabilize the current state
Niche Level Rules	▪ References to aspects and conditions that describe the individual state of CP at a specific school or the CPP context ▪ References to aspects and conditions that are perceived to be new, unique, or contrasting to the prevalent conditions
LANDSCAPE FACTORS	▪ References to broad overarching factors that have affected recent developments in a significant and that are perceived as important and beyond the actors' control ▪ References to factors previously assumed to be relevant (namely, *Fridays for Future* (Otto et al., 2020) and the ongoing COVID-19-pandemic)
TECHNOLOGICAL ARTIFACTS / INFRASTRUCTURE	▪ References which emphasize the current state and use of the existing infrastructure at schools, incl., building stock and significant places at school[5]

Table 3: Classification system with types of classification in alphabetical order.

Following this, the coded segments were extracted into a separate document (step 4). The next steps (steps 5 and 6) were informed by the inductive coding techniques from Kuckartz (2018) and Mayring (2010). The inductive techniques were chosen in order to work more closely on the

material and to be able to extract key content and topic-related categories directly from the interviews. This was significant to the research as transition studies in particular require a degree of openness and flexibility that avoids restricting or distorting data or the documented experiences that it includes (Geels et al., 2018). Furthermore, Mayring's rules for qualitative data analysis guided the development of inductive codes (Mayring, 2010). This included translating, paraphrasing, and generalizing the data segments. As the interviews were conducted in German, the translations into English were necessary to introduce a common terminology. At this point, close attention was paid not to deviate significantly from the original statements to ensure unbiasedness. The focus lied on the content-bearing statements, those which addressed the research objectives. This required again a review and confirmation of each segment's relevance to these objectives; irrelevant segments were deleted and excluded from the analysis.

In contrast to the conceptual MLP-oriented classifications assigned in the previous steps, the focus for inductive codes was on themes and topics that emerged from the data themselves and on developing categories accordingly. Overall, 37 inductive categories were developed and the data was coded along these categories. As an outcome of the analysis, each data segment was assigned one of the five classifications (deductive) as well as one of the 37 categories (inductive).

4.3.3 Interpretation and Structuring of the Data

Finally, the data were interpreted and structured to inform the research objectives (step 7). This task was completed by analyzing the 37 categories one by one and within clusters of related categories. These clusters helped to consolidate the results and indicated different contexts, realms, or areas related to CP.[6]

Firstly, the analysis focused on the rules that were identified as part of the school system. All of the data segments classified as RULES were closely examined to determine the underlying rule dimension. This entailed the characterization of each data segment as either associated with the regulative, cognitive, or normative rule dimension. Furthermore, the associated level of the rule was determined by assigning regime or niche level (if not done so in the initial coding process). At last, the drivers and barriers were specified by determining whether the segments revealed generally positive and supporting forces or generally negative or hindering forces.

[5] References to specific data on energy usage and efficiency as part of the CPPs were excluded from the analysis due to a lack of relevance to the research objectives (instead, the focus lied on qualitative and socio-institutional factors).

[6] However, these clusters (ten, in total) served as guidance during the analysis process but are not represented the structure of the results.

Secondly, the analysis dealt with the actors and interactions. This procedure was very similar to the previous one; it only differed in that it omitted the assessment of the rule dimensions. The focus lied on those segments classified as ACTORS and (INTER)ACTIONS. Subsequently, the segments were assessed regarding the regime or niche level and the drivers or barriers. Moreover, it was determined which actors or actor groups were represented and significant in the school system overall. Actors were characterized by determining the scope in which they operate (e.g., in the school context or in public office) and the roles they fulfill (e.g., concrete tasks or responsibilities). For the interactions between actors, it was important to identify with whom the different actors interact and how those interactions were perceived. This was done by analyzing each segment referencing interactions and it resulted in a grid of interactions displaying them as either "positive", "negative / difficult", or "ambivalent" (if there were no mentions or indications, the relationship was excluded).

At last, the segments classified as TECHNOLOGICAL ARTIFACTS or INFRASTRUCTURE were considered in the analysis and complement some of the data. Additionally, LANDSCAPE FACTORS are outlined separately in the later results.

5 Results

5.1 General Data Analysis

This chapter is dedicated to displaying and outlining the results of the research. It is organized along the research objectives of this thesis. It starts by addressing the first sub-question of the research which was to identify the rules that constitute the school system and that are associated with integrating CP (sub-chapter 5.2); then, it addresses the second sub-question in order to identify and characterize the key actors and their interactions (sub-chapter 5.3); lastly, it focuses on the overarching research question to identify overall drivers and barriers for the transition towards more climate awareness in the school system (sub-chapter 5.5). Sub-chapter 5.4 corresponds to other influences and landscape factors which were additionally considered and incorporated in the drivers and barriers in sub-chapter 5.5. This first sub-chapter 5.1 gives a general overview of the data analysis and the distribution of statements and codes.

In total, 1136 segments were derived from the interviews and analyzed. There were 273 statements from the ADM actor group, 352 statements from the IG actor group, 349 statements from the TE actor group, all of which were comprised of three individual interview partners; there were 162 statements by the STU actor group, which was comprised of only two interview partners.[7] Table 4 shows the number of the statements according to the assigned deductive codes (classifications).

Statements According to Deductive Codes:		**No. of statements:**	**Notes:**
Classifications (deductive codes)	ACTORS	92	-
	(INTER)ACTIONS	201	Including both Actor-Relationships and Activities
	RULES	715	-
	Regime Level Rules	325	-
	Niche Level Rules	390	-
	TECHNOLOGICAL ARTIFACTS / INFRASTRUCTURE	17	-
	LANDSCAPE FACTORS	111	-

Table 4: Statements according to deductive codes.

[7] To recapitulate, the four actor groups in this thesis are: political-administrative actors (ADM), network partners and interest group actors (IG), students (STU), and teachers (TE); the latter two groups both represent school actors. In the following representation of the results and mentioning of actors, they are each referred to with their assigned tokens (see Table 2). When the reference is to all the actors of one actor group, it is indicated as, e.g., ADMs, IGs, and so on.

Table 5 shows the inductive codes (categories) organized by clusters as well as the number of statements per category. A more detailed version of this, including statements according to actor, is attached in Appendix II (Table A. 1). Detailed summaries of the categories, according to clusters, can also be found in Appendix III.

Statements According to Inductive Codes:		**Total no. of statements[8]: 933**
Clusters	**Topic-related categories (inductive codes)**	**No. of statements**
Approaching CP	Approach to CP	42
	Reaching young people	7
CPPs concrete	CPP implementation	62
	CPP visibility / perception	31
Experience + motivation	Hands-on experience	20
	Impact and motivation	42
	Intrinsic motivation	42
Interpersonal aspects	Being collaborative	28
	Communication	20
	Individuals taking initiative	23
	Student-teacher-relationship	14
	Support	22
	CPP participants / cooperation	59
School system	Coordination	23
	School spaces	9
	School system + structures	55
Teaching focus	Outside expertise	24
	Curriculum	113
	Teacher education	20
	Teachers' role	8
Organization + structures	Subject structure	18
	Heavy workload	23

[8] This number excludes statements with the classifications ACTORS and LANDSCAPE FACTORS, i.e., this table also excludes the remaining 5 inductive codes in these classifications (1 in actors, 4 in landscape factors).

Overall Discourse	Awareness	71
	Public discourse	18
Political financial aspects	Public budget	27
	Funding practices	3
	Funding programs	6
	Systemic shortcomings	21
	Teacher/personnel shortages	6
Political strategic aspects	Political agenda	34
	Political processes	21
	CP as a strategy	21

Table 5: Statements according to inductive codes.

5.2 Rules Constituting the School System and Associated with the Integration of CP

5.2.1 Overview

This chapter addresses the first sub-question of the research: *What are the rules that constitute the school system and that are associated with the integration of CP?* This question focused on identifying the practices and structures, related to the integration of CP, that are present in the school system and on determining how they are carried out and (re)produced. The results are organized according to the respective rule dimension.

To recapitulate, these rule dimensions refer to regulative, cognitive, and normative rules. The regulative dimension of rules describes structures, procedures, or regulations, which are specifically defined and characterized through their coercive or mandatory nature; regulative rules are legally governed. Cognitive rules describe the frames through which individuals interpret and attribute meaning to things. These rules are based on the cognitive and intelligent processes of individuals that determine, for example, mindsets, beliefs, paradigms, principles, or priorities. The normative rule dimension refers to values and social norms. Most notably, these are morally governed rules, which determine people's ideas of what things should be like, how individuals should behave, or what is expected of them.

Overall, the relevant results for this research question give various insights. Rule-related aspects were detected in all of the thematic categories, meaning that all clusters and contexts of the school system revealed rule-based patterns, practices, and structures.

Many rules were found at niche level indicating that these rules are not as established or rigid yet and that they are shared by a small number of people in the niche. Other rules were identified at the regime level. Those are characterized by much more stability and dominance throughout the system and acknowledged by a much larger number of actors. In addition to

identifying the existing rules and their respective dimensions, the objective was to indicate whether rules represent supporting or hindering forces (i.e., drivers or barriers) for climate awareness in the school system.

The following sections (5.2.2 - 5.2.4) provide detailed accounts of the rules that were identified. To reiterate, rules in socio-technical systems are not clearly defined principles or tenets[9]. This was also observed in this research and the following representations of rules should be interpreted as patterns, notions, or tendencies that were associated as constituting and representing the school system.

Regulative rules addressed:

a. Hindering Structures and Formal Requirements at School Level
b. Recognizing and Adapting to the Existing Political Processes

Cognitive rules addressed:

a. The Matter of Implementing the Right Strategies
b. Increasing Awareness Amidst a Challenging Public Discourse
c. Taking the Right Approach to Climate Protection
d. Motivational Hands-On and Self-Effective Experiences
e. Creating a Supportive Environment

Normative rules addressed:

a. The Unappreciated Role of Schools in Society
b. Increasing Normative Pressure in Political and School Contexts
c. Challenging Old Practices and Forging New Roles

5.2.2 Regulative Rule Dimension

a. Hindering Structures and Formal Requirements at School Level

The regulative rules of the school system were detected almost exclusively at the regime level; they included a few major themes (for an overview, see also Table 6). First of all, the interviews demonstrated the inherent rigidity of the school system and the resulting challenges to integrate CP. Next, teacher education and the procedures of the curricula were considered. Lastly, the actors discussed the problems resulting from the heavy workload of school personnel.

The first aspect was mentioned by several actors and relates to the system framework itself. Actors pointed to the challenging federal structures of the

[9] With the only potential exception being formal and regulative rules, such as laws.

school system, including the complex authority system and the strict framework of the school (IG1, pos. 115; IG2, pos. 18). It was lamented that there is too little flexibility in the system altogether and this rigidity was identified as a core problem, as was also emphasized in this statement (researcher's translation, original quotation):

> "das Problem ist […], das Bildungssystem ist ja ein relativ starres System." (ADM2, pos. 26).

Furthermore, it was noted that the school as a public institution is quite restricted (TE1, pos. 83). Because it has organically evolved over a long period of time, it cannot quickly or easily change (STU2, pos. 102). According to the interviews, this challenge of rigid structures also extends to the way subjects and teaching contents are organized at school. Here, the existing practice of strictly separating contents and topics into individual subjects was mentioned as a hindering factor; especially when it comes to such multidimensional issues as climate change (ADM2, pos. 26, 88; TE3, pos. 56).

As a second major problem, the actors discussed the role of CP in the core curriculum and teacher education and identified several difficult regulative procedures. Here, several actors pointed out that current school curricula fail to adequately reflect CP topics and climate awareness (as is explained in more detail and related to cognitive rule aspects in sections 5.2.3 a and c). This was associated with the nature of school curricula themselves, which is why this aspect is important in its regulative dimension. Curricula are meant to be stable instruments, they are developed to last for an extended period of time (ten to twelve years), and are strict in what subject matter they mandate (ADM2, pos. 84; IG1, pos. 115; IG3, pos. 64). However, this uncovers the fact that topics that suddenly gain prominence and societal relevance such as CP (as it suddenly became a popular topic among young adults) are difficult to integrate into the curriculum swiftly (ADM2, pos. 86). In any case, it was also mentioned that curricula are extremely full in terms of content (researcher's translation, original quotations:

> "Wenn du aber in der Oberstufe bist, besonders in der 12 und 13, musst du den Stoff durchkriegen fürs Abitur. Und dann hat man weniger Spielraum […]" (TE1, pos. 49);
> "Gerade im Grundkurs ist das fast nicht zu schaffen, die Schüler auf das Abitur vorzubereiten, weil der Lehrplan so wahnsinnig vollgepackt ist, auch die Obligatorik fürs Abitur." (TE3, pos. 50)).

This is in part due to shorter school tracks (switch from G9 to G8[10]) but can also be attributed to the immense pressure on students when it comes to the centralized graduating exams (researcher's translation, in German: "Abitur"). Then, CP topics often fall short and mandatory topics are prioritized. By extension, challenges of the curriculum (and of the absence of CP)

[10] The regular Abitur track in Germany originally lasted thirteen years, nine of which were completed at a secondary school (G9). A controversial reform was implemented in the beginning of the 2010's, which shortened the track to the Abitur to only twelve years of schooling (G8) and caused a heated debate about the burdens and impositions of school actors (van Ackeren 2018).

also relate the role of the teacher. Here, actors addressed teacher education programs and the fact that teachers are often ill-prepared for CP topics. The reasons for this were associated with a lack of standards and official guidelines for training teachers for CP (IG1, pos. 88, 123; IG2, pos. 12, 30, 62; IG3, pos. 38, 44; TE1, pos. 31). This aspect is also brought up later in a normative context (see section 5.2.4 c) and in terms of what roles teachers must fulfill.

In addition to the abovementioned issues, the high workload of teachers and school administrations emerged as a third main theme with regard to hindering structures and requirements. Especially teachers identified this as another important aspect. It was reported that CPPs are often an additional responsibility (meaning overtime, without compensation) for the teachers (IG2, pos. 12: IG3, pos. 36, 48). What is more, both teachers and school administrations operate within an already stressful working environment, in which working overtime, having little to no spare capacities, and overall high stress levels are a daily occurrence (IG3, pos. 36, 46; TE2, pos. 112, 118; TE3, pos. 18). Taken together with teacher and overall personnel shortages, this points to the fact that integrating CP in the curriculum or as a CPP is, by no means, a simple task (IG1, pos. 27; IG2, pos. 12).

a. Hindering Structures and Formal Requirements at School Level		
Rule aspects manifested in:	**Rule aspects exist at:**	**Rule aspects represent:**
▪ Inherent rigidity of the school system ▪ Inadequate teacher education for CP topics ▪ Tradeoffs between reliability and openness of the curriculum ▪ Heavy workload for teachers and school administrations	Regime Level	Barriers

Table 6: Hindering structures and formal requirements at school level.

b. Recognizing and Adapting to the Existing Political Processes

The interviews also revealed regulative rule aspects with respect to political processes and with cognitive aspects playing a critical role in this as well. This is because several of the discussed aspects were not only associated with regulative procedures and practices, but also with the actors' attitudes towards them. It is noteworthy that these aspects were predominantly addressed by ADM and IG actors and that the discussion of complex decision-making processes was not perceived as only negative. Instead, the actors acknowledged their complexity and the need to adapt to them. The accounts regarding these regulative rule aspects focused on political decision-making processes as well as on project funding and financial aspects (see also Table 7).

Most importantly, the actors highlighted the complexity of political processes. One actor alluded that the political decision-making is often similar to a game of poker (ADM3, pos. 30) and pointed out that finding compromise is a vital part of politics. A political consensus can be frail and unstable and solutions are often not accepted by everyone (ADM2, pos. 72; ADM3, pos. 26). Presenting students with this complexity and for students to become familiar with these kinds of dilemmas can be a powerful tool in raising awareness (researcher's translation, original quotation:

> "[ich] halte […] das für sehr, sehr wichtig, weil dann auch die Schülerinnen und Schüler mal diese Dilemma-Situationen erleben […] [Wo] machen wir Abstriche und was ist uns wichtiger oder wo gewichten wir tatsächlich die Schwerpunkte...? Dass man die Schülerinnen und Schüler daran beteiligt […]" (ADM2, pos. 50)).

On a positive note, one actor pointed out that politicians finally recognize the need to formally implement CP into their agenda. This was associated with international agreements and the fact that there are legal obligations to implement CP in the school (researcher's translation, original quotation:

> "Ja, weil die Bundesregierung […] verstanden hat, dass das ein weltweites Abkommen ist mit Verpflichtungen, das Deutschland auch unterschrieben hat." (IG1, pos. 31)).

Other regulative dimensions dealt with financial and funding practices. While funding for CPPs was overall viewed positively and as driving CPP development (ADM1, pos. 10; IG1, pos. 86; IG3, pos. 2), problems were identified as well.[11] IG2 (pos. 32-44) pointed out that many CPPs and initiatives are faced with difficulties by the end of their project term. Because funding is only made available for a period of time, projects often lack permanent support and cannot be continued. For said actor, this represented a deeper struggle of established funding practices and a challenging financial environment overall.

b. Recognizing and Adapting to the Existing Political Processes		
Rule aspects manifested in:	**Rule aspects exist at:**	**Rule aspects represent:**
▪ Complex decision-making processes and dilemma situations ▪ Challenging funding regulations for long-term CPP implementation	Regime Level	Barriers

Table 7: Recognizing and adapting to the existing political processes.

[11] Interestingly, two actors directly contradicted each other with one emphasizing the perceived abundance of state or federal funding opportunities (ADM1, pos. 126) and the other lamenting that there is hardly any funding available (ADM3, pos. 34).

5.2.3 Cognitive Rule Dimension

a. The Matter of Implementing the Right Strategies

The cognitive rule dimension strongly relates to how people perceive and interpret their surroundings and, by this, how they set priorities or strategies. In the context of implementing the right strategies for achieving more climate awareness, the interviews revealed several important notions (see also Table 8). Firstly, it was addressed that there is the need for an explicit and coherent political will, together with the need to follow through on promises. Secondly, the actors pointed to the lack of CP in the curriculum and the need to make it a priority instead. And, lastly, the need to institutionalize and standardize CPPs (activities) was discussed.

First of all, in a political dimension, several actors from across all actor groups pointed to the absence of a political will, coherent CP strategies, and long-term thinking by important decision-makers. They perceived there to be some motivation for change among politicians, but not a consistent one (ADM1, pos. 132; ADM2, pos. 16, 66; ADM3, pos. 36; IG2, pos. 46, 82). In light of this, it was considered crucial to receive more substantial support and raise awareness for CP among politicians, as expressed in this statement (researcher's translation, original quotation):

> "[…] wir brauchen den Gestaltungswillen von Politik für gesellschaftliche Veränderungen […]" (ADM3, pos. 24).

Besides the need for political will to create change, appropriate actions need to be taken. However, actors often observe politicians showing support without actually taking hands-on measures (IG2, pos. 48; STU1, pos. 64; TE1, pos. 117-124, TE2). Still, one actor acknowledged a paradigm shift to be underway (ADM3, pos. 24) and both ADM and IG actors pointed to the ubiquity of climate change and CP topics and to several examples of municipal and public departments, in which CP has already become a fixed strategic element (ADM1, pos. 128; ADM2, pos. 12, 82; IG3, pos. 10).

Related to this, actors criticized decision-makers for not following through on promises and priorities. The tendency in politics to make vague or evasive statements was addressed (TE1, pos. 119) and, furthermore, a somewhat stubborn attitude of trying to keep things as they are (researcher's translation, original quotation:

> "[…] da sind einfach viele Politikerinnen und Politiker so 'Ach ne, jetzt ist das plötzlich ein Problem, […] wir sind sonst immer gut durch gerutscht'" (STU1, pos. 82)).

Politicians and administrators were also considered to fail in making CP a priority and to put off responsibilities for concrete measures, such as school renovations (IG3, pos. 58). The actors drew a strong connection from CP strategies to budgetary and financial aspects as well (ADM2, pos. 66; IG2, pos. 18; IG3, pos. 52; STU2, pos. 102; TE1, pos. 117; TE2, pos. 122). It was mentioned that proper strategies and prioritization should correspond to

the allocation of adequate financial resources. Instead, actors said there is a lack of funds and too little investment into schools.

As another important notion, several actors (predominantly school actors) pointed out that CP is still not included sufficiently in the core curriculum and there is a need to make it a priority. This was associated with inadequate prioritizations made by decision-makers in the past (TE3, pos. 48). Instead, the actors mentioned that if CP is addressed at all, it is usually on a superficial level (STU1, pos. 22; STU2, pos. 22; TE2, pos. 44). Furthermore, CP is often not a relevant topic for final exams (TE3, pos. 50) and the way it is dealt with strongly depends on the respective teacher (TE1, pos. 49). Overall, the interviews showed that there remains a need to prioritize CP and to adequately incorporate it in the curriculum.

Lastly, shifting the focus from the regime level and towards the niche activities, actors pointed out similar difficulties for the implementation of CPPs. Most importantly, actors identified the need to coordinate and institutionalize CPPs. IG and ADM actors criticized that, where CPPs exist, they are often a combination of loose activities and there is no coherent foundation or institutionalization for continuous CP efforts (ADM2, pos. 14; IG2, pos. 12; IG3, pos. 34). It was also reported that new ideas and concepts are often missing and teachers resort to what they know, such as lecture style teachings (STU2, pos. 22). Appropriate CP strategies, guidelines, overarching concepts, or visions for schools could be a way to streamline activities and to help, for example, CPPs to better succeed, as some actors pointed out (researcher's translation, original quotations:

> "[…] da muss auch das Konzept der Schule stimmen, dass die irgendwie die Möglichkeiten haben, einzugreifen […]" (TE1, pos. 109)
> "Ich glaube, was wir uns alle prinzipiell wünschen, ist erstmal ganz klar, in welche Richtung können wir eigentlich in Deutschland oder weltweit steuern und was kann man uns mehr an die Hand geben […]" (TE2, pos. 44)).

In relation to this, many positive, past efforts were acknowledged, such as the *UNESCO Global Action Program on Education for Sustainable Development* (ESD) as a guideline for schools. Several actors highlighted the importance of integrating CP as a cross-cutting theme into the school context (ADM2, pos. 82, 84; ADM3, pos. 48; IG1, pos. 123; IG3, pos. 34, 44). In this case, ESD can be viewed as an endeavor with a goal similar to CPPs. While the ESD program also includes regulative, formal aspects (i.e., the binding character of ESD guidelines), the actors emphasized the potential of transforming learning and teaching patterns and the overall philosophy and priorities of schools.

a. The Matter of Implementing the Right Strategies		
Rule aspects manifested in:	**Rule aspects exist at:**	**Rule aspects represent:**
▪ Need for a coherent political will and measures to raise climate awareness ▪ Need for CP as a priority in curricula and lesson contents	Regime level	Barriers
▪ Need for more holistic CP concepts and orientation ▪ Need for institutionalizing CPPs	Niche level	Drivers

Table 8: The matter of implementing the right strategies.

b. Increasing Awareness Amidst a Challenging Public Discourse

Other cognitive elements derived from the interviews addressed the public discourse and climate awareness in society overall; in addition, statements shed light on how climate awareness differs in the context of CPPs and within a school (see also Table 9).

On the regime level, several actors addressed positive factors, such as an overall increased awareness for climate issues in society and the trend of CP to become more influential (ADM2, pos. 74; ADM3, pos. 42; IG1, pos. 103; IG2, pos. 26; STU1, pos. 80; STU2, pos. 22). It was also noted that CP is now much more present for a variety of decision-makers, for example, for those in businesses (IG1, pos. 29). One actor even reported that this growing sensitivity for the topic has made his work easier, meaning that he does not have to justify why CPPs could be beneficial (IG2, pos. 28).
Still, actors mentioned ongoing controversies and difficulties regarding the topic. Most notably, there was discontent about the level of discourse (ADM2, pos. 60, ADM3, pos. 18; STU1, pos. 80).
Criticism also pointed to the lack of honesty and openness in debating the issues and possible consequences (researcher's translation, original quotation:

> "Aber niemand, auch nicht die Grünen sagen, wie machen wir das jetzt eigentlich? Was bedeutet das eigentlich, klimaneutral? Was heißt das eigentlich? Wie viel Geld kostet mich das eigentlich? Also ich meine, es wird Geld Kosten, aber da fehlt mir die Ehrlichkeit in der Debatte; auch zu sagen, euer Leben wird anders werden. Es wird anders werden, wenn das denn wirklich der Wunsch der Mehrheit ist, dass wir klimaneutral werden, wird es anders sein […], sagt aber niemand." (IG2, pos. 28)).

Other aspects included the continuous negative prejudices of CP and reservations from politicians towards the topic. Politicians were also perceived as being annoyed or even anxious at young adults advocating for CP and calling them out for failing to address it (STU1, pos. 82; STU2, pos. 30, 36).

Moreover, politicians were also observed as often dismissing their own responsibilities and instead passing it on to others (researcher's translation, original quotation:

> "Ein anderes Problem, was ich sehe, ist […] in welcher Form öffentliche Debatten geführt werden […] und man eine Verantwortung auf die Schule und die Lehrer lässt, jetzt quasi: 'Mach doch mal Umweltschutzprojekte!'" (IG2, pos. 12)).

When it comes to youth specifically, varying trends were observed. While some actors perceived young people to be the core advocates and drivers behind CP (ADM3, pos. 42; IG3, pos. 48; STU2, pos. 76), another mentioned difficulties in reaching students. These students, reportedly, have other priorities than climate change, including graduating, earning a lot of money, and achieving upward social mobility (researcher's translation, original quotation:

> "'Wir sind aus dem Gastarbeitermilieu, die Mehrheitsgesellschaft hat 30 Jahre lang auf uns herab geguckt und jetzt werde ich erstmal meinen Weg machen! Ich werde Chef, ich werde Geschäftsführer, ich will einen Mercedes fahren und was diese grünen Idealisten da wollen, verstehe ich ehrlich gesagt nicht, weil es passt nicht zu meiner Agenda…'" (TE3, pos. 12)).

On the niche level, cognitive trends regarding the awareness for CP could be observed in the context of the school and the CPPs. Several actors agreed on the importance and positive influence of CPPs on raising awareness. They mentioned that these projects have the potential to adequately convey CP and the urgency it requires as well as to change the ways of thinking in the immediate context (ADM1, pos. 120; IG3, pos. 62; TE1, pos. 11; TE3, pos. 16, 44). It was further noted that CPPs can provide evidence for the fact that students can make an impact by simply raising awareness for CP in their school (ADM3, pos. 20). This was also highlighted by a teacher who mentioned the need to *comprehend* CP because then taking action becomes the logic next step (TE3, pos. 12).

b. Increasing Awareness Amidst a Challenging Public Discourse		
Rule aspects manifested in:	**Rule aspects exist at:**	**Rule aspects represent:**
▪ Increasing awareness and visibility of CP issues in society	Regime level	Drivers
▪ Challenging public discourse ▪ Lack of honesty, openness, and pragmatism ▪ Negative prejudice and reservations towards CP	Regime level	Barriers
▪ Positive influence of CPPs on climate awareness	Niche level	Drivers

Table 9: Increasing awareness amidst a challenging public discourse.

c. Taking the Right Approach to Climate Protection

Another important cognitive rule dimension was identified as taking the right approach to CP at school. The following section deals with the approaches taken in the niche and what actors perceived to be challenges and opportunities. Three main themes stood out in determining the right approach to CP: firstly, considering the students' perception of CP topics and appealing to them, secondly, providing realistic and student-oriented approaches, and, thirdly, avoiding a single person focus and limited visibility of the projects (see also Table 10).

Firstly, in terms of reaching students and considering their attitudes and perceptions, several actors talked about the opportunities that schools provide. In particular, one actor mentioned the strong influence schools can have on shaping young minds and on helping to raise awareness for issues like CP (IG1, pos. 113, 143). A teacher added to this by saying that CP is such a prominent and present topic on students' minds that they definitely will want to talk about it and it is easy to approach the topic (TE1, pos. 45). However, it also became clear that this aspect can be ambiguous as some actors felt that the school does not provide the right context to motivate and mobilize young people (STU2, pos. 82; TE1, pos. 81; TE3, pos. 5). Also, when trying to incorporate CP more broadly in the curriculum, it was reported that students dismiss topics taught in school with the effect that the urgency of CP is not appropriately conveyed (researcher's translation, original quotation:

> "[…] 'das muss eins von diesen Problemen der Erwachsenen sein, was sie uns da im Unterricht immer nahbringen…'" (TE3, pos. 6)).

This was underlined by a student who reported to lose interest in subjects when teachers fall back on the same contents and teaching routines, without trying to appeal to their students (STU2, pos. 24).

Regarding the second mentioned theme, providing realistic and student-oriented approaches, the actors discussed various opportunities CPPs offer. This becomes especially important given the above stated ambiguity. Several actors agreed that finding a student-oriented approach within CPPs or in class is a key principle (IG2, pos. 22; IG3, pos. 34, 66, TE1, pos. 51). One actor pointed out that initiatives often fail to do so and described the often employed, but questionable problem-solving strategy of adults trying to handle an issue themselves (researcher's translation, original quotation:

> "Der Regelweg ist leider, oder so ist meine Wahrnehmung, es wird gesagt, 'wir müssen das machen', dann macht es irgendeiner und dann wird gesagt, 'So guckt mal, wie toll das geworden ist!' und dann sagen alle, 'Ja stimmt!'… und gehen nach Hause…" (ADM2, pos. 52)).

In this actor's experience, this occurs at the expense of excluding and even patronizing students and of not leaving any room for free associations or new ideas. Likewise, it is important to pick up on the students' real-life experiences ("Lebensrealität" (ADM2, pos. 20)) and to appeal and adapt to their mindsets. By being aware of this, CPPs could ensure that the students' interests and ideas are considered and that students sense excitement and a personal drive. It was added that teachers and other CPP participants need to accept that motivation may not come intrinsically or voluntary to all (TE3, pos. 8; IG2, pos. 22).

Furthermore, the importance of addressing the complexity of CP and of aligning CPPs accordingly was pointed out; otherwise, activities would run the risk of becoming haphazard and compromising the multidimensional nature of CP (ADM2, pos. 16, STU2, pos. 78). On the other hand, schools and actors in CPPs should be encouraged to take simple actions and be rewarded for making the attempt and activities should not become overcomplicating or demoralizing (ADM1, pos. 46, 66). One actor underlined this by saying that if everyone tries to do something to the best of their abilities, then, people can change the status quo (ADM3, pos. 60). In line with this, it was emphasized that there are benefits of giving schools and CPP participants the freedom to decide on what issues to get behind, how to implement measures, or how to spend the money earned (IG3, pos. 32); also taking note of the fact that motivation can only develop, if participants are independent in their decision-making (researcher's translation, original quotation:

> "[…] weil wir glauben, dass eine Motivation nur dann entstehen kann, wenn man frei mit der Entscheidung ist." (ADM1, pos. 42)).

In addition, two actors reported that it is important not to take an idealistic stance in CPPs as this could lead to not being taken seriously by the students or to students being put off by the idealism (IG2, pos. 24; TE3, pos. 16).

As the last main theme regarding the approach to CP, actors considered the challenges of a strong single person focus and limited visibility of CPPs. The interviews revealed that CPPs are often carried by single individuals, such as teachers, school personnel, or parents. It was stated that motivation and commitment among those individuals are very high, that they are very proactive, and full of good ideas. While these are positive factors, some actors also mentioned the problems of fully relying on such individuals. As they said, CPPs can face a dilemma when this individual leaves the school or suddenly becomes unavailable (ADM2, pos. 12; IG1, pos. 29). A second problem is that, with only one individual in charge, working and cooperating with others can become complicated, as experiences from one actor showed (researcher's translation, original quotation:

> "[…] das scheitert auch manchmal an diesen engagierten Einzelpersonen, weil das häufig auch Leute sind, die machen eben auch gerne alles alleine und sagen dann eben auch gerne, 'Ohne mich geht es eben nicht!'" (IG3, pos. 48)).

Another problem is that this narrow focus on a single individual or a few people can reduce the impact and visibility of the CPP and put even more pressure on the participants to succeed.

This difficulty to increase visibility of CPPs was an issue that stood out particularly. Predominantly school actors mentioned the insufficient signaling effects and the limited impacts of CPPs as well as the fact that those projects are often only known among those involved, but not beyond (STU1, pos. 50; TE3, pos. 24, 34). Moreover, it was said that especially visibility is highly dependent on the person in charge and on the way in which CPP activities are implemented (ADM1, pos. 64). This was evident when comparing the visibility and prominence of the S4F and the EG project. In general, many actors perceived S4F to be more visible and better known among more people. EG, on the other hand, was perceived to be much smaller, with a smaller range of participants, and perceived as one-sided because it mainly addresses a single topic (STU2, pos. 62, 76; TE1, pos. 29, 33, 35; TE2, pos. 64). However, one actor claimed that schools trying to maintain a certain image and competing with each other in EG can be a motivating factor for some (ADM1, pos. 62).

c. Taking the Right Approach to Climate Protection		
Rule aspects manifested in:	**Rule aspects exist at:**	**Rule aspects represent:**
▪ Importance of considering the schools' impact on shaping young minds and appealing to students' perceptions of schools and CP topics	Niche level	Barriers
▪ Need to provide realistic and student-oriented approaches to CP and to avoid idealistic approaches and prohibitions		Drivers
▪ Reliance of CPPs on single individuals to carry efforts and commitment ▪ Challenging and sometimes insufficient signaling effects and visibility of CPPs		Barriers

Table 10: Taking the right approach to climate protection.

d. Motivational Hands-On and Self-Effective Experiences

There were numerous cognitive elements with respect to the positive and motivational effects of active participation in CPPs. These elements highlighted, first, the direct feedback and appreciation CPPs can offer, second, the importance of hands-on experiences and self-efficacy, third, the motivating effect of having responsibilities, and fourth, the high level of personal motivation and commitment of CPP participants (see also Table 11).

First of all, the actors agreed that CPPs offer a variety of positive impacts and that their importance does, not least, lie in the fact that they can facilitate direct exchange between students, school administrations, and school authorities and show different ways to get involved. Through their involvement, students receive immediate feedback from, for example, the school administration which affects them positively because it is a way to receive important appreciation and validation (IG3, pos. 32; TE1, pos. 105; TE3, pos. 26).

Secondly, many actors highlighted the significance of having a sense of achievement through the activities and a feeling of self-efficacy[12]. According to IG1, it gives students the direct feedback of being able to do something (researcher's translation, original quotation:

[12] Self-efficacy is a theory attributed to the psychologist Albert Bandura that explains as to why individuals or societies fail to solve the challenges of climate change and claims that self-efficacy is a key principle for people to become motivated and take action (Heald, 2017). Self-efficacy describes the belief in one's own abilities to perform necessary actions in order to make a difference (Hamann et al., 2021).

> "[…] und geben vielleicht so eine Rückmeldung: 'ich kann was tun'" (IG1, pos. 105)).

Others talked about pride and excitement of students involved; another important part of the CPPs is that they encourage active participation and differ from regular lessons or learning from a book (ADM1, pos. 44; ADM2, pos. 48; ADM3, pos. 12; STU1, pos. 76; STU2, pos. 94; TE3, pos. 6). According to many actors, action-oriented learning adds a new practical dimension and these small-scale activities in an immediate environment can offer inspiration and motivation. Here, actors highlighted the sense of achieving something and the effect of being able to make one's own observations, which were also reported to be crucial because dealing with complex CP issues can quickly lead to demotivation or frustration among participants (researcher's translation, original quotations:

> "[ich habe das Gefühl], dass man wirklich etwas machen kann." (STU1, pos. 60)).
> "[…] ich muss erstmal echte Erfahrung sammeln. Ich muss erstmal gucken, was heißt das eigentlich, wie fühlt sich das eigentlich an…" (IG2, pos. 32)).

Thirdly, teachers highlighted that having a task and a responsibility within CPPs is a rewarding, motivational factor as well and is, by itself, a meaningful experience for students (TE1, pos. 17). This is especially important to younger students as they enjoy working for their class community and are eager to contribute (researcher's translation, original quotation:

> "[…] dass sie jünger sind und gerne etwas für ihre Klasse tun, gemeinsam mit ihrer Kasse machen […]" (TE2, pos. 84)).

Lastly, there is a high level of personal motivation among the CPP participants. The actors discussed their own convictions and beliefs regarding CP and their enthusiasm to get involved. One actor even stated that it would be hypocritical to teach CP or to get involved in CPPs and not personally support the cause (TE1, pos. 65). With regard to students, several actors reported that because the topics related closely to the students' personal life, they are easily motivated (ADM2, pos. 50; STU1, pos. 28; TE2, pos. 14). The fact that many students volunteer to participate in the CPPs is another indication of this high level of commitment (TE1, pos. 9). One actor stated that the key in all CP endeavors is to trigger *some* kind of internal motivation among people and noted that this can be achieved in different ways (researcher's translation, original quotation:

> "Der Schlüssel, um Klimaschutz zu erreichen, ist am Ende, dass ich irgendeine innere Motivation erzeuge bei denjenigen, die sozusagen eine Veränderung hervorrufen sollen, das zu tun."
> (IG2, pos. 22, researcher's emphasis)).

d. Motivational Hands-On and Self-Effective Experiences		
Rule aspects manifested in:	**Rule aspects exist at:**	**Rule aspects represent:**
▪ Direct feedback, incentives, and appreciation from CPPs ▪ Experiences and feelings of self-efficacy through CPPs ▪ Rewarding responsibilities in CPPs, especially for younger students ▪ High level of personal motivation and commitment among CPP participants	Niche level	Drivers

Table 11: Motivational hands-on and self-effective experiences.

e. Creating a Supportive Environment

Many actors highlighted the importance of a supportive and cooperative environment between the people involved and the accounts give insights into the mindsets and attitudes of niche actors (see also Table 12).

First of all, the actors mentioned the importance of cooperation across different groups and that everyone has to engage and come together. While sometimes challenging, this realization was thought to be a driving force to work well together and to take CP seriously (ADM1, pos. 96; ADM2, pos. 52; TE1, pos. 109). One IG actor added to this by emphasizing that CP should be viewed as a collective process (researcher's translation, original quotation:

> "[…] das ist ein gemeinsamer Prozess, da kann man auch gemeinsam was lernen und darauf muss man sich einlassen […]" (IG3, pos. 38)).

Secondly, this coincided with the need for a supportive environment. Here, the actors, especially school actors (TE and STU), emphasized the support and openness they are experiencing from within the school where many of the people involved share the same mindsets and interests (STU1, pos. 34; STU2, pos. 42, 52; TE2, pos. 96; TE3, pos. 18). Furthermore, CPP participants perceived this openness as recognition and a gesture to continue with their activities and involvement. One actor expressed this strikingly and pointed to the benefit of an open-minded and perhaps even adventuresome school administration (researcher's translation, original quotation:

> "[…] die Motivation oder der Wille der Schulleitung, einen Lehrer an der langen Leine zu führen, weil er mal was durchführen möchte, auch vielleicht auf die Gefahr hin, dass er irgendwie, ich sage jetzt mal, aufs Maul fällt [lacht] oder irgendetwas schief geht, ja, experimentierfreudig... Kann ich mich nicht viel beklagen." (TE1, pos. 91)).

There were only a few indications that there is not enough support for CPPs. Among these, there were mentions of too little effort from school authorities for CP and of inadequate support from school administrations (STU1, pos. 64; TE3, pos. 18).

e. Creating a Supportive Environment		
Rule aspects manifested in:	**Rule aspects exist at:**	**Rule aspects represent:**
▪ Support and openness within the school ▪ Cooperation among different groups	Niche level	Drivers

Table 12: Creating a supportive environment.

5.2.4 Normative Rule Dimension

a. The Unappreciated Role of Schools in Society

In terms of the normative rule dimension, the interviews shed light on the school and its role in society. The actors discussed several main trends; first, there is a perceived indifference towards schools and a gap between schools and society, second, schools and actors do not receive sufficient appreciation and recognition, and third, there is a lack of access to schools and coordination with outside actors (see also Table 13).

First of all, a key problem in the school's role in society is the indifference towards the school as an institution and the gap between schools and society that actors perceived. ADM and IG actors pointed out that schools often lag behind cultural and societal developments and recognized this lack of concern through the overburdening of schools and referred to the numerous tasks and expectations schools must meet. Most notably, ongoing shortages of teachers and personnel were emphasized as they prevent schools from fully thriving and developing. (ADM2, pos. 60, 88; IG2, pos. 82). While this is a development that was viewed as a systemic problem at the regime level, challenges were also noted by the actors with regard to niche activities and incorporating CP. Here, school actors often feel neglected and especially IG actors highlighted that schools are left alone and overwhelmed by what is in front of them (researcher's translation, original quotations:

> "Da werden sie auch alleine gelassen, also da mache ich den Schulen auch gar keinen Vorwurf, also das ist auch ganz wichtig." (IG2, pos. 90);
> "[…] aber das schafft eine normale Schule in aller Regel nicht, das ist ja auch gar nicht ihre Aufgabe." (IG3, pos. 46)).

As a second main trend, many actors noted that schools as educational institutions do not receive sufficient or adequate recognition and appreciation. Several actors observed this as manifested in the current state of the physical school infrastructure (i.e., the school places: buildings, rooms, and the campus altogether). They stressed the need to put more effort into these places themselves and to create a better and friendlier learning environment (researcher's translation, original quotations:

> "[…] aber [die Schüler und Schülerinnen] müssen dazu Platz haben." (TE3, pos. 60);

> "[…] es geht aber um die Orte an sich […]" (IG3, pos. 54);
> "[…] aber wenn man sich allein Schulgebäude [in Norwegen und Schweden] ansieht […], dann merkt man, dass da zum Beispiel das Thema Schule einfach ganz anders wahrgenommen wird. Und dasselbe würde ich mir halt für Deutschland und auch für Nordrhein-Westfalen wünschen."
> (STU2, pos. 102)).

In relation to this, several actors drew a connection between how schools are valued in society and the investments made into public school infrastructure, or rather, the lack thereof. They pointed to the dilapidated conditions that school buildings are in and admitted to feeling ashamed or sad about the overall situation (IG3, pos. 56). In general, the education sector was perceived to often be overlooked in financing and CP to not be prioritized, as was expressed in several statements (researcher's translation, original quotations:

> "[…] ein Investitionsstau aus den letzten 30 Jahren […]" (ADM2, pos. 74);
> "[…] in vielen Schulen in Deutschland herrscht ja so ein gewisser Missstand […]" (IG3, pos. 24);
> "Ich finde es schade, dass man da so weit ist, dass man da nur drüber lachen kann […], weil eigentlich ist es natürlich traurig […]" (STU2, pos. 98)

Teachers added a political dimension by saying that policies need to better focus on schools and their students and that politicians should actively demonstrate support for schools, for example, by making pledges and substantial investments (TE1, pos. 117; TE2, pos. 122)

As another trend, IG actors brought up the lack of access to the school system and the difficulties regarding coordination between schools and outside actors. Schools were compared to a "black box" (IG2, pos. 84) and as closed off spaces that are difficult to enter for outsiders. Here, it was proposed that direct linkages to connect schools and outside actors are necessary (IG3, pos. 34). These coordinative aspects were also associated with regulative structures, e.g., by creating designated positions and structures for coordination. (researcher's translation, original quotation:

> "[…] eine Grundidee, dass man eben darüber außerschulische Partner mit in die Schule reinbringt mit allen Vorteilen […] und dass man das dann eben koordiniert, organisiert und […] jeweils in den Regionen zentrale Koordinierungsstellen dann macht […]" (IG1, pos. 88)).

But this perceived lack of access to the system and the degree to which schools are closed off, instead, highlight the secondary role attributed to schools as societal institutions (ADM2, pos. 26; STU2, pos. 98). At the same time, these aspects also showed that schools themselves often hesitate to reach out to other actors or underestimate the need for outwards coordination. It was hinted at this self-perception by stating that schools do not see themselves as an actor actively participating in society (IG2, pos. 56, 88).

a. The Unappreciated Role of Schools in Society		
Rule aspects manifested in:	**Rule aspects exist at:**	**Rule aspects represent:**
▪ Indifference towards the school as an institution ▪ Gap between schools and society ▪ Lack of appreciation and recognition and of investments into school infrastructure ▪ Lack of access to schools ("black box")	Regime Level	Barriers

Table 13: The unappreciated role of schools in society.

b. Increasing Normative Pressure in Political and School Contexts

While the understanding and awareness of CP as an urgent issue refers to a cognitive dimension (as described in above, see 5.2.3.b), the actors also discussed the normative pressure and influences that result from this. First, at the regime level, this refers to the importance of public pressure and demands for political decision-makers. Second, at the niche level, this involved drawbacks for CPPs and negative implications in dealing with highly charged normative issues (see also Table 14).

Firstly, several actors mentioned the fact that pressure from the public is increasing. Especially actors from ADM and IG actor groups highlighted the importance of such pressure and demands (researcher's translation, original quotations:

> "Also solche Entwicklungen müssen dann natürlich gesellschaftlich verankert werden." (IG1, pos. 109);
> "[…] weil das Thema einfach drückt." (ADM1, pos. 92);
> "[…] ich glaube, es gibt ein super Momentum gerade, Klimaschutzziele zu erreichen." (IG2, pos. 26)).

Moreover, they identified politicians and school authorities as the important actors to be targeted by these demands. Here, the actors also elaborated on the importance of public pressure for setting a new political agenda for CP (STU2, pos. 26; IG2, pos. 12). But actors voiced their disappointment in political decision-makers and the discouragements from the past. This was emphasized by accounts on current political leaders not meeting expectations (IG3, pos. 54; STU1, pos. 80; TE1, pos. 117; TE3, pos. 18).

Nevertheless, while normative pressure and influences were clearly perceived as important in the debate on CP and for raising climate awareness, actors also brought up some of the risks involved with these highly charged normative issues. Here, the school actors (STU and TE) pointed out that restrictions in connection with CP are often perceived negatively and that people could be reluctant to participate, if CPPs would prescribe certain behavior (e.g., banning certain food from the cafeteria) (STU1, pos. 40; STU2,

pos. 78; TE2, pos. 44; TE3, pos. 44). Especially for CPP activities, the actors highlighted the importance of implementing CP measures in an encouraging way and based on common values, instead of sanctioning behavior or demonstrating moral high ground. It was further mentioned that feeling (morally) superior to others is problematic and destined to fail (researcher's translation, original quotation:

> "Und dieses, sich über andere erheben […], das ist immer problematisch. Ich glaube, dass das zum Scheitern verurteilt ist und auch eine große Gefahr ist in der gegenwärtigen Diskussionslage um Klimaschutzthemen"
> (IG2, pos. 24)).

b. Increasing Normative Pressure in Political and School Contexts		
Rule aspects manifested in:	**Rule aspects exist at:**	**Rule aspects represent:**
▪ Importance of public pressure on politicians and decision-makers	Regime level	Barriers
▪ Challenges in dealing with highly charged normative issues ▪ Need to avoid restrictive approaches and moral high ground	Niche level	Barriers

Table 14: Increasing normative pressure in political and school contexts.

c. Challenging Old Practices and Forging New Roles

The interviews also revealed several normative rule aspects with regard to the role dynamics between CPP participants and to a particular role for teachers. There were three key notions that the actors discussed (see also Table 15). The first one addresses the regime level and the challenges of current teaching practices and of the heavy workload at school. The second notion highlights niche activities and the importance of introducing outside expertise into the school. The third one addresses the niche as well and encourages CPP participants, especially teachers, to overcome old role dynamics and to take on new roles.

The first notion addresses the regime level and the concerns about the way of organizing subjects and teaching. One teacher mentioned that lecture-style teaching is often used as the easiest, but not the most ideal solution (TE3, pos. 60). Some actors agreed that new teaching approaches and methods are needed (STU2, pos. 16, 20; IG1, pos. 143) However, not all actors agreed that lecture-style teaching should be abolished altogether, stating that it can be an effective method (IG2, pos. 82). In this regard, the relationship between students and teachers was addressed and it was

mentioned that students are often underestimated or not taken seriously (researcher's translation, original quotation:

> "[…] [wir, die Erwachsenen] neigen ja immer dazu, den Schülern nicht zuzutrauen, dass sie die richtigen Fragen stellen, die richtigen Entscheidungen treffen können […]" (ADM2, pos. 48)).

Furthermore, the immense workload of school actors was perceived as a critical factor at the regime level as well (TE1, pos. 31, 81; TE2, pos. 112). It was reported that teachers, at times, felt overwhelmed by the tasks they handle and that the challenges along the way sometimes destroy the initial motivation (IG2, pos. 82). The roles and the responsibilities teachers must fulfill are challenging and, according to the actors, they cannot and should not be blamed for falling short of these expectations.

In relation to this high workload, a second important notion was put forth by IG actors as they emphasized the significance of bringing outside expertise into the school (e.g., as part of CPPs). They associated outside experts and counsel with additional support, new perspectives, and approaches, which can enrich current teaching practices and to help teachers better fulfill their role at school. (IG1, pos. 92; IG3, pos. 34, 36).

A third important aspect that was pointed out is the importance of challenging established practices and doing things differently. This was highlighted by actors who emphasized the need for new collaborative working forms and for more open-mindedness altogether. Abandoning hierarchies and authority structures was a key aspect for them as it allows for new, more equal learning environment between students and teachers (ADM2, pos. 88; STU2, pos. 50, 54; TE1, pos. 97). Actors highlighted the opportunities of forging mutually respectful relationships and allowing students as well as teachers to take on new roles. The actors associated teachers to be particularly significant in these new dynamics and encouraged them to take on new roles, to be willing to keep learning, and to act more as facilitators and supporters of students rather than traditional teachers (ADM2, pos. 26; TE3, pos. 64) (researcher's translation, original quotation:

> "Ich stelle mir auch vor, dass Lehrerinnen und Lehrer sich mehr zu Moderatoren entwickeln, die das Selbstlernen unterstützen…" (IG1, pos. 143)).

However, changing common role dynamics and authorities is not without its challenges, as one actor pointed out, and can put teachers in a strange or uncomfortable situation. It can also be difficult as they might have insecurities or reservations about new CP topics or about new dynamics between students and themselves (IG3, pos. 38). The actors explained these insecurities with the fact that teachers often feel discouraged or not competent enough, but in other cases it can be attributed to a simple lack of interest by some teachers.

c. Challenging Old Practices and Forging New Roles		
Rule aspects manifested in:	**Rule aspects exist at:**	**Rule aspects represent:**
▪ Established teaching practices and high workload	Regime level	Barriers
▪ Encouraging the incorporation of outside expertise as support, especially for teachers	Niche level	Drivers
▪ Need to overcome traditional hierarchies and to create more equal relationships ▪ Encouraging students and teachers to take on new roles	Niche level	Drivers

Table 15: Challenging old practices and forging new roles.

5.3 Actors and Interactions in the School System

5.3.1 The Structuration of Actors

This chapter focuses on the actors in the school system and on interactions and relationships between them. It addresses the second sub-question of the research: *Who are the relevant actors in the school system and how do they interact with each other?* By this, it gives insights into the structuration of key actors involved with integrating CP into the school and the nature of their relationships. Furthermore, it explores whether actors are associated with the regime or the niche level of the school system and potential linkages between the levels are indicated.

This section focuses on the key actors in the school system, as depicted in The structuration of actors according to level affiliation (researcher's depiction).Figure 5, and shows their structuration according to the associated level. The proposed structuration is based on the insights of the actor characterization as well as the preceding analysis of the rules and (regulative) structures.

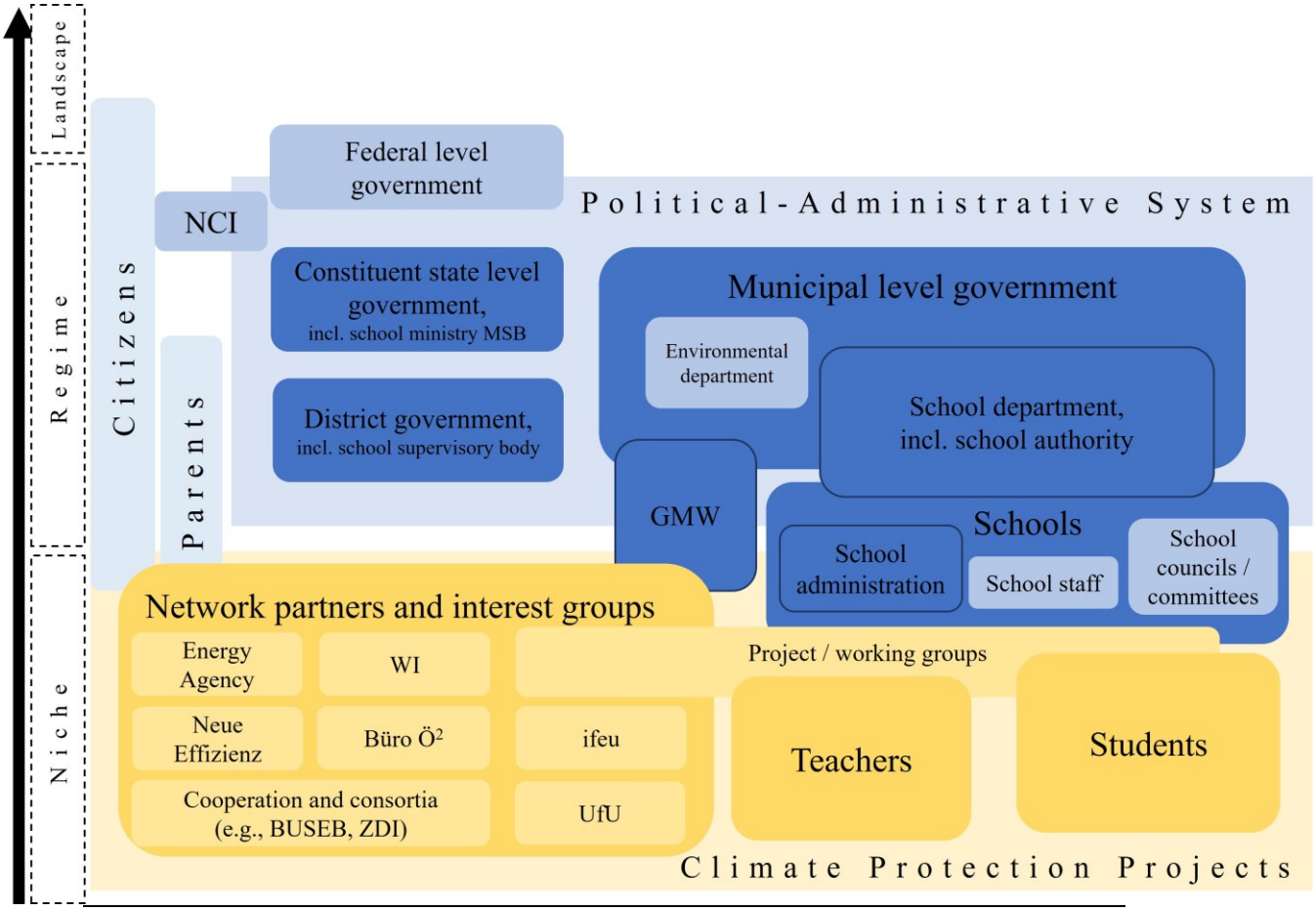

Figure 5: The structuration of actors according to level affiliation (researcher's depiction).[13]

[13] Regime actors are shown in blue, niche actors in yellow. Key actors (or groups of actors) are highlighted in darker shades, other actors in lighter ones.

a. Regime Level Actors

The regime level represents the stabilizing and replicating forces within the socio-technical system. Therefore, regime level actors are characterized through an inherent and established logic, which drives them; rules and practices are well known, clear, and concise. Most importantly, actors were considered to be part of the regime because of their association with established organizations or entities. While there may be individuals within these organizations with linkages to the CPPs and to the niche overall, the organization altogether does not have that connection. Instead, these organized regime level actors are characterized through prescribed tasks and responsibilities and with duties bound by law.

For the school system, the following were identified as regime level actors:

- Federal state level government,
- Constituent state level government,
- Respective district government,
- Municipal level government, and
- Schools.

Other actors that were only marginally considered included parents and citizens; due to their heterogeneity, these actors are proposed to be ambiguous and cross-level actors.

The federal level government as a regime actor only plays a minor role in the perception of the actors. Albeit federal legislature is crucial when it comes to policymaking and in connection with the challenges of federal structures of the German school system, the actors attributed more importance to other government levels (see below).

The constituent state level government was more present in the perception of the actors. In particular, actors mentioned the relevant state-level ministry for school and education (in German: *Ministerium für Schule und Bildung des Landes Nordrhein-Westfalen* (MSB)) to be of great importance. This may be because of the proximity of the interviewed actors to constituent state level policy and the cultural sovereignty in school policy. It became clear that the MSB was viewed as the direct political linkage and the immediate authority for the schools and the respective actors.

The district government fulfills many constituent state level functions and tasks, for example, the school supervisory function, and is closely related to the constituent state level government. Although this government entity represents the intermediary between municipal and constituent state level government, it was only marginally addressed in the interviews. A linkage to the niche was identified for this actor with regard to ESD (ADM2, pos. 8, 10). ESD represents, itself, a unique approach to CP and there were indications that this actor is highly involved with promoting, albeit distinct, niche activities. While ESD guidelines and adaptations to the core curricula are developed in the district government (and by extension, the constituent

state level government), these activities differ from established practices and represent a new development. The fact that not all of the sixteen constituent states have ESD guidelines in place yet, is another indication of this (IG1, pos. 31, 33).

Another regime level actor is the municipal government, which with its formal and institutionalized tasks and functions represents an established actor. In the analysis, the school department (incl. the school authority) and the municipal building management of Wuppertal (GMW) stand out as actors with a key role, and both suggest strong linkages with the niche. For the case of Wuppertal, the GMW is directly involved in the niche and responsible for managing and implementing EG in schools.

In general, it was reported that often the school authority takes the initiative for implementing CPPs (IG2, pos. 58). It was also suggested that school authorities are under a lot of pressure to take action and are, therefore, left with no choice but to initiate EG or similar *50:50*-projects (IG3, pos. 24). When initiative comes first from the schools themselves, it was pointed out that, for example, EG can be a means to exert pressure on the school authority and to demonstrate strong motivation and commitment from below (IG3, pos. 24).

Similar niche-regime structures can be suggested for schools. The interview data (and the regulative rules analysis) showed that schools operate within a strict and clear logic and are embedded within established structures. This is especially true for school administrations. On the other hand, schools provide the context and the places for CPPs and various actors at the school are deeply involved with niche activities.

b. Niche Level Actors

Niche actors are characterized by their innovative drive and the active involvement to change established rules and practices. They often pioneer innovation and call for action and new regulations or lifestyles. In the case of this research, this corresponds to actors involved in the CPPs - those engaged and committed for CP and for raising climate awareness. Therefore, the following were identified as niche actors in the school system:

- Students involved in CPPs,
- Teachers involved in CPPs, and
- Network partners and interest groups.

Students and teachers in the CPPs, alike, can be considered niche actors as they are the ones actively contributing to incorporate CP in the school and work to raise climate awareness. These actors aim to establish more sustainable practices in the school and introduce innovative and new ways for schools to function (STU2, pos. 14, TE3, pos. 26). The rules analysis has previously shown that participants show a great level of personal motivation towards CP and that there are linkages between personal attitudes and

their activities; this emphasizes the distinctiveness of the patterns and rules, according to which CPP actors operate.

Network partners and interest groups are considered niche actors as well. While they fulfill a variety of functions within the socio-technical system, in the case of this research, it became apparent that they are key actors driving CPP activities and supporting school actors. Network partners and interest group actors are attributed an important networking function as they foster cooperation between various other actors or form consortia in an effort to consolidate resources and knowledge (IG2, pos. 54, 56). But because they are often dependent on funding from official sources (e.g., the NCI funding program by the federal environmental ministry (BMUV)) or contracted by school authorities to implement a CPP, they can be viewed as inherently connected to regime actors (IG2, 34, 36, 60; IG3, pos. 36).

5.3.2 Interactions and Relationships in the Niche

This section characterizes the interactions and relationships between the key actors, particularly those within the niche and as part of the CPPs.

As previously shown in the general data analysis, interpersonal aspects were of great importance for the results of this study. Naturally, interpersonal connections played a major role in analyzing the actor relationships and interactions. The data revealed the importance of good and equal communication as well as the need for regular and open exchanges. Although some difficulties were mentioned with regard to communication, the interactions were mostly positively described. Overall, participants in CPPs valued mutual trust and personal connections.

Figure 6 depicts the interactions between the key actors. This grid of interactions is based on the experiences from the interview partners, with whom they interact, and how they perceived the interactions and relationships to be. The relationships and interactions between the different key actors are described in more detail below.

	School actors						*Public / Political actors*			*Others*
Interactions between:	School as a whole	Students	Teachers	School administration	Other personnel	Parents	Municipal government (school authority)	GMW (municipal level entity)	District government	Network partners / Interest groups
School as a whole[14]	-						o			-
Students	+	o	+	+	+					
Teachers		+	+	o		+				
Municipal government (school authority)	o									
GMW (municipal level entity)	o	+	+					o		
District government	+			+						
Network partners / Interest groups	+	+	+		+		o			+

Notes / Key:

+ (positive)
- (negative / difficult)
0 (ambivalent)

important / very strong indications

no mentions / no indications

Figure 6: Interactions and relationships of CPP actors (researcher's depiction).

[14] Interactions regarding the "school as a whole" address, either interactions with actors within the school that were not specified, or interactions between different schools.

a. Students

The interviews showed that students overall interact positively with various actors. Students interact positively with the school overall. Most importantly, students have a good and collaborative relationship with teachers. It was mentioned that knowing each other on a personal level is as a benefitting factor in starting off the work in CPPs (researcher's translation, original quotation:

The interviews showed that students overall interact positively with various actors. Students interact positively with the school overall. Most importantly, students have a good and collaborative relationship with teachers. It was mentioned that knowing each other on a personal level is as a benefitting factor in starting off the work in CPPs (researcher's translation, original quotation:

> "[…] ich kannte [den Lehrer] jetzt auch schon seit der [5. Klasse], deswegen wusste ich irgendwie auf jeden Fall […], auch wenn ich etwas hätte, was mir nicht so gut gefällt, dass ich da auch dann vielleicht Kritik äußern könnte. Also […] ein gutes […] Lehrer-Schüler-Verhältnis würde ich sagen, ist da auf jeden Fall gut, und nicht irgendwie verkrampft oder so." (STU1, pos. 30)).

Nevertheless, students said that it is essential for teachers to be open-minded towards different working relationships and dynamics because, otherwise, collaboration could become challenging (STU2, pos. 28, TE1, pos. 83, 97).

The working relationship of students amongst themselves was perceived ambivalently. Many activities within the CPPs were described as running smoothly. According to both students and teachers, the age of participants or the respective grade level matters for how well participants work together. On the one hand, in the teachers' experience, they suspected younger students to generally be more motivated and older students, particularly those reaching puberty, to be less enthusiastic about extra-curricular activities or CP as a relevant issue (researcher's translation, original quotation:

> "[...] wenn so die Pubertät einsetzt, fängt ja das ein oder andere an, ein wenig sich zu verändern und dann werden bestimmte Dinge auch ja als uncool abgetan oder Ähnlichem. Und dann fängt es natürlich [an], dann schon mal ein bisschen schwieriger zu werden. Man muss dann viel mehr auf Dienste manchmal drängen und achten als bei Fünfern und Sechsern [...]" (TE2, pos. 84)).

On the other hand, in one student's experience, younger CPP participants sometimes demonstrate less commitment and dedication, which can cause difficulties while working together (STU2, pos. 74).

In terms of school administrative and other staff at the school, students work well these actors and reported open-mindedness for collaboration, especially from the cafeteria or the janitorial staff (IG2, pos. 2; STU1, pos. 30; TE2, pos. 56, 62).

b. Teachers

The actors perceived teachers to have a positive relationship with students. They related this to the equal collaboration that they cultivate and the students' commitment to get involved. Problems were only reported for students in a certain age group (e.g., some students reaching puberty) who are sometimes difficult to work with or lose interest (see above). Still, in the teachers' perspective, this is common and little problematic and, overall, interactions are positive. Furthermore, teachers mentioned that working together with a few students can be sufficient and even more effective than working with larger groups of participants (researcher's translation, original quotations:

> "[…] glaube ich, reicht, wenn das eine Handvoll macht" (TE1, pos. 31);
> "Also der arbeitet mit dieser kleinen Schülergruppe, glaube ich, ganz effektiv und er hat auch schöne Erfolge." (TE3, pos. 34)).

Teachers work well with other teachers and actors highlighted the need for a supportive environment (TE2, pos. 68; TE3, pos. 18). The relationship between teachers and school administration was described as ambivalent. While, overall, the actors felt that they are supported, they also mentioned that difficulties sometimes arise when trying to communicate with school administration (see also cognitive rules analysis). But some said this is likely due to the high workload, not for a lack of concern (TE2, pos. 112; TE3, pos. 18). Overall, however, it emphasized that usually all the parties involved make an effort to find common ground (researcher's translation, original quotation:

> "Und es wird auch dann darüber diskutiert, was können wir umsetzen, wo sind Ressourcen vielleicht auch frei, was können wir machen." (TE2, pos. 96)).

Interactions between teachers and parents were also perceived positively. Teachers generally do not expect (all) parents to become involved in CPPs or afterschool activities in general, but if some do, this is even more positive (TE2, pos. 46, 48). Teachers perceived some parents to always come through and to show support, which is greatly appreciated among CPP participants (researcher's translation, original quotation:

> "Wenn dann irgendwie 80 Prozent [der Eltern] sagen, 'Ne, kein Bock, oder ich habe keine Zeit', auch absolut legitim, ist ja nicht deren Job, aber dann gibt es 20 Prozent, die sagen, 'Ja ich habe da eine Idee!'" (TE1, pos. 95)).

c. Schools as a Whole

Interactions of schools as a whole or between different schools were not addressed in detail. However, there were some indications of the competitiveness between schools. While some schools can be motivated for CPPs through incentives or competition, this can become a problem for others. As one actor reported, strong competition among schools can be demotivating

for some school, which do not have sufficient resources (researcher's translation, original quotation:

> "[…] und die haben alles gemacht, was man so machen konnte. Dann sagen aber natürlich die anderen Schulen […], 'wir können das nicht mehr hören, was die alles machen, weil das kriegen wir so nicht hin und das ist viel zu viel'. Und das ist das Problem mit diesem Leuchtturmprojekten […]" (IG3, pos. 46)).

The collaboration between schools and IG works particularly well when there are assigned positions responsible. In some cases, actors make use of a coordination office with the sole purpose to connect different actors (IG1, pos. 29, 96; IG2, pos. 84). This degree of coordination is necessary and would be beneficial because just making the initial contact was reported to be difficult at times and to go according to random principles (researcher's translation, original quotation:

> "[…] es kommt immer drauf an: habe ich jemanden, der interessiert ist?" (IG2, pos. 10)).

d. Network Partners and Interest Groups

In relation to this, network partners and interest group actors reported that once contact with the schools is established, the working relationships are very positive (IG2, pos. 56).

In general, these actors work well with the various others at the school (students, teachers, and other personnel) and several accounts mentioned open and straightforward communication, mutual support, and an easy-going way of collaborating (see also above).

The fact that network partners and interest groups bring in an outside perspective and additional support was highlighted and perceived as especially positive and helpful. Especially with the COVID-19-pandemic putting a strain on schools and creating difficulties for school activities, teachers welcomed the support and efforts from the outside partners in CPPs (researcher's translation, original quotation:

> "[…] auch zwischendurch mal ein bisschen Druck gemacht, so auch in Corona-Zeiten, so 'auch wenn ihr eure Schüler jetzt nicht da habt, jetzt müssen wir mal langsam in die Puschen kommen'... Hatte ich zwischendurch mal ein bisschen Schweiß auf der Stirn [lacht], das alles hinzukriegen, aber dieser Druck war dann auch hilfreich." (TE3, pos. 26)).

The interactions between network partners and interest groups and the school authority were described in different ways. On the one hand, network partners offer support and positive encouragement to the schools, which is an important factor for school authorities to contract outside experts. On the other hand, this is an investment that authorities need to be willing to make, and in some cases, the fact that this service were considered too expensive has been a reason to omit CPPs (IG1, pos. 27; IG2, pos. 10, 14, 18; IG3, pos. 10).

In terms of cooperation with other network partners, the relationship is perceived as positive. Although, technically, these different institutes and organizations (e.g., *ifeu*, *UfU*, or engineering firms) are in competition with each other, there is a lot of exchange and cooperation (see also above).

e. Municipal school authority and GMW

The role of the municipal school authority and the interactions with other actors was addressed with only a few statements. In the relationship between school authority and the schools, the actors pointed out that, above all, it is important to bring both parties together (IG2, pos. 60). Especially for the EG project or similar *50:50*-projects, the support of the school authority is essential as they have to foot the bill for energy costs and benefit from potential energy savings. But if CPPs are implemented with the help of outside partners, there are additional costs involved (see above). Furthermore, it was mentioned that many municipal governments (and by that, the school authorities) do not offer CPPs for their schools at all. In the experience of network partners and interest groups, this is attributed to the additional efforts and work required for monitoring energy usage (researcher's translation, original quotations:

> "Ich habe allerdings zu 90 Prozent Städte erlebt, denen war das zu mühevoll und die haben quasi, sind gescheitert mit dieser Berechnung." (IG3, pos. 18)
> "Also warum machen das Bezirke nicht? Weil sie sagen, ihnen ist es zu teuer oder [...] sie sind der Meinung, das würde sich nicht lohnen, was [...] nachgewiesenermaßen Quatsch ist [...]. Also wir haben ja eher das Problem, dass wir stadtseitig zu wenig Personal [haben], die haben ja nicht mal einen Überblick über ihre Energieverbräuche, können sie gar nicht auswerten. Also sie haben keinen, der sich hinsetzt und einmal für alle Gebäude der öffentlichen Hand auswertet, wie ist eigentlich die Entwicklung der Energieverbräuche [...]" (IG2, pos. 16)).

The GMW had a unique role in the interactions. As the GMW is responsible for implementing EG, the experiences differ from the problems mentioned above. Most notably, in the sense that the GMW interacts directly with students, teachers, and schools overall to implement EG (ADM1, pos. 70, 72). While some statements mentioned the fact that communication can be difficult, the overall working relationship was perceived positively. Here, the personal connection plays an important role (researcher's translation, original quotation:

> "Häufig ist es so, bei den Schulen, wenn die halt sehen, jemand ist vom [GMW] da, dann ist es fast egal, wer das ist [...] Sobald ein Kollege [...] an den Schulen ist, man erfährt einfach alles! [...] Weil da manchmal die Kommunikationswege vielleicht, die auch nicht so ganz deutlich sind [...]" (ADM1, pos. 36)).

Besides, it was mentioned that within the GMW communication can be a challenge. While this is not directly related to CPPs, it highlights the complexity of this regime actor and the dichotomy between the individuals involved with CPPs and those not involved (ADM1, pos. 82, 132).

f. District Government

Interestingly, the district level government was only marginally addressed in the interactions. This may be due to the fact that the actor interviewed did not directly participate in CPPs but is part of other CP-related activities (amongst others, developing ESD guidelines).

Overall, the exchange and interactions between schools and the district government were described as positive. But they are not without challenges. It was expressed that the two actors do not necessarily interact closely with each other and, in some cases, only do so, if major problems arise (researcher's translation, original quotation:

> "[…] ich stecke natürlich nicht detailliert im System, also ich weiß nicht genau, was vor Ort an Fragestellungen, an Problemen auftauchen, außer wenn die Probleme so groß werden, dass die Schule das nicht mehr alleine lösen kann oder will, dann werde ich eingebunden." (ADM2, pos. 36)).

5.4 Landscape Factors and Other Influences

5.4.1 The COVID-19-Pandemic

The COVID-19-pandemic, which has paralyzed many countries and quickly the entire world since the beginning of 2020, played an important role for schools and, by this, in the research. Nearly all actors addressed the pandemic and associated it with negative effects. Most importantly, they said that the pandemic in combination with the far-reaching public health measures have overwhelmed schools and shifted the focus away from CP. Not only did it slow things down and reduce opportunities for activities, but it also revealed that there are many more substantial problems at schools, besides CP. Namely, the pandemic highlighted the unpreparedness of schools for shifting to remote learning due to the only partially digitalized schools as well as the systematic oversight and failure to invest in school infrastructure (e.g., in extensive renovation measures or supplying health and safety equipment, such as air filters). In light of this, some actors pointed out that the pandemic could, in fact, be an opportunity for addressing these various shortcomings.

Besides this, the individuals themselves were highly affected by the COVID-19-pandemic. One actor empathized with young adults and stated that they had to put up with a lot over the past years (researcher's translation, original quotation:

> "Denn ich finde, auch gerade jetzt bezogen auf COVID, haben die Jüngeren viel einstecken müssen zum Schutz der Älteren, was richtig ist, denke ich, was aber viel von den Jungen wieder abverlangt hat." (TE2, pos. 88)).

5.4.2 The *Fridays for Future* Movement

The FFF movement played a prominent role in the research as well. By almost all actors, the movement was viewed as a positive and an immensely important development of the past. Many said it has helped to raise awareness and call attention to climate change. Overall, it has amplified the topic and public discourse, and many considered it a blessing and an opportunity. Furthermore, teachers mentioned the immense impact and signaling effects of the movement and the consequent opening that has occurred at schools thanks to FFF (researcher's translation, original quotation:

> "[…] dieses Meinungsöffnen, das hat auch vorher viele Jahre gefehlt." (TE1, pos. 103)).

In addition, the actors perceived FFF as an opportunity and a development which has reduced barriers of CP and, in many cases, has made implementation of CP easier. While it has contributed to motivate some people, several of the interviewed actors mentioned that they have become interested and involved in CP beforehand. Overall, FFF was perceived a major driving factor for CP (researcher's translation, original quotations:

> "[...] FFF hat da richtig was bewegt (ADM3, pos. 42);
> "Aber die Auseinandersetzung findet eben statt und das ist, glaube ich, ein Verdienst dieser FFF-Demonstrationen, [...] also das kann man, glaube ich, unumstritten sagen." (ADM2, pos. 64);
> "Wir haben mit der FFF-Bewegung, die hat enormen Einfluss auf ganz viele Bereiche genommen, die sitzt plötzlich in ganz vielen Gremien drin, in denen ich bin, wo die vorher nicht drin waren." (IG2, pos. 26)).

Another important development triggered by FFF, according to some actors, is young adults learning to make difficult decisions. One actor was especially impressed by the capacity of students to evaluate whether CP is of such significance for them that they would decide to skip school and participate in the demonstrations. It was also underlined that FFF should be perceived as something more than skipping school (researcher's translation, original quotation:

> "Es wurde immer reduziert auf Schulschwänzer [...] Und ich finde das Auseinandersetzen mit der Frage, was ist mir denn wichtig... Wenn ein Oberstufenschüler sich entscheiden muss, habe ich, gehe ich da in den Kurs, in dem ich auch Abitur mache, oder gehe ich lieber zu dieser Demonstration und arbeite dann selbstständig alles nach... Dann ist das ja eine enorme Entscheidung für einen jungen Menschen, die muss man ja erstmal treffen und ich finde, jemand der solche Entscheidungen für sich treffen kann, der ist echt gewachsen und der ist da reifer geworden und der wird auch in der Lage sein, bei seinem weiteren Weg dann richtige Entscheidungen zu treffen und die Welt entsprechend zu gestalten." (ADM2, pos. 58)).

In relation to the FFF movement, generational aspects were also discussed and it became clear that age plays an important role in the discourse on CP. Several actors attributed young people to approach difficult topics in a unique way and to have distinct ways of communicating them, as opposed to older generations with a rather rigid way of thinking. These actors viewed

the fact that CP is addressed continuously by younger people as a positive factor and an opportunity. A student underlined the implications for the younger generation by mentioning burdens from the past and the need to speak up (researcher's translation, original quotation:

> "[…] meine Generation [ist] schon so davon geprägt, dass wir […] die schlechten Taten der Vergangenheit irgendwie aufräumen müssen." (STU1, pos. 82)).

5.4.3 Other Influences

Other factors that were mentioned in the interviews with some relevance to the developments in CP and to the transition towards climate awareness included the process of digitalization at schools, budgetary issues as well as overall political developments.

The digitalization and digital media played an important role during the interviews and several actors referred to the positive effect of media and the internet in spreading awareness. One actor mentioned that the momentum of the FFF movement was only possible because of social media. On the other hand, the process of digitalization emerged as a major issue for schools, mainly because it presents such challenges.

For the Wuppertal in particular, the financial situation was mentioned as another important and problematic factor as well. Actors pointed to the difficult socio-economic structures and inequities in Wuppertal and the challenging budgetary conditions in Wuppertal (researcher's translation, original quotations:

> "Die Stadt Wuppertal ist ja auch so eine Nothaushaltskommune […]" (ADM1, pos. 84);
> "[eine] Haushaltssicherungskommune wie Wuppertal" (ADM3, pos. 34)).

In a political context, the German federal election that was held in October 2021 (after the interviews had taken place) was on several actors' minds. Hereby, they noted a highly charged and fierce debate, especially with regard to CP, some even addressing CP as the decisive issue for the election.

5.5 Drivers and Barriers for Transitioning Towards More Climate Awareness

This thesis addressed the overall research question: *How do actors in climate protection projects perceive drivers and barriers for transitioning towards more climate awareness in the German school system?* In doing so, it analyzed and discussed various aspects and developments of the school system and provides insights into the school as a socio-technical system and for the potential transition towards climate awareness. Building on the two sub-questions and the main research question, the thesis identified key drivers and barriers and characterized them according to the MLP framework. The results present a variety of rules, structures, and practices

constituting and representing the school system as well as interactions and dynamics between actors, all of which play a determining role in the transition towards climate awareness. The most important findings are outlined below and represented in according to the associated analytical level.

While many positive factors have been found, overall, it became apparent that the school system is constituted by more hindering than driving aspects. Most importantly, the research reveals that many of these barriers are rules, especially regulative ones, that exist at the regime level and inhibit the more systemic integration of CP in the school system. These key regulative rules amount to hindering structures and formal requirements at the school level and a challenging political environment. The inherent rigidity of the school system altogether stands out as a crucial barrier. The complexity and challenge of the existing political processes further add to the rigid structures and inflexibility of the school system. As a result, it is difficult to adapt to and incorporate CP and it is, to date, inadequately represented in the curriculum and in teacher education programs.

Furthermore, barriers were identified in terms of normative rules. Deep-set normative practices and role dynamics appear to hinder the integration of CP; however, increasing normative pressure may induce change. The normative dimension altogether highlights that the school system is somewhat marginalized and unappreciated in political decision-making and society. Consequently, much more focus and pressure are needed in order to even begin to trigger a transition process of the school system altogether.

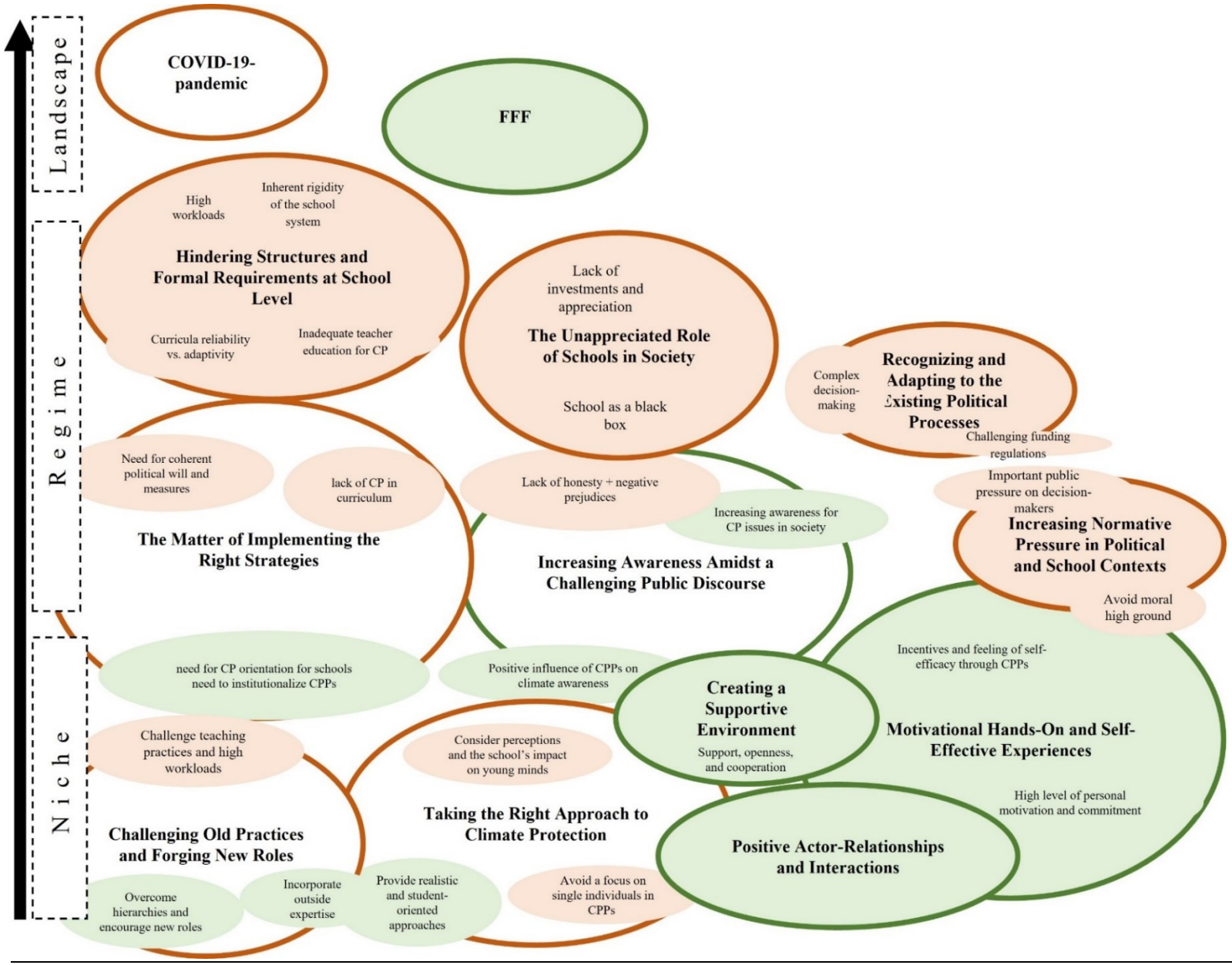

Figure 7: Overall drivers (green) and barriers (red) for the transition towards climate awareness in the school system (researcher's depiction).

The research also shows that the cognitive rule dimension plays a significant role in the transition towards climate awareness and cognitive aspects are, in fact, most widespread. Specific barriers include, for example, coherent political willingness and actions, and the absence of CP in core curricula and lesson contents. The cognitive rules also reveal that despite a perceived increased climate awareness in society, the discourse on topics involving CP remains challenging and is shaped by insincerity, hypocrisy, negative prejudice, and reservations. Further barriers for the transition towards more climate awareness in the school system are the complexity of taking the right approach to CP and the ambiguous perceptions of schools.

At the regime level, drivers highlight the importance of strategic orientation and of demonstrating willingness to act. Mostly, however, drivers were identified at the niche level. The hands-on approaches and the focus on students and their self-effective experiences stand out as driving forces for climate awareness at school and CPPs have the potential to reinforce these positive influences. Furthermore, CPPs provide necessary CP orientation and guidance for teachers or schools and a more standardized and institutionalized CP concept.

The actor analysis shows that the interactions are positive and constructive. In fact, there were no indications that relationships are exceptionally negative. Overall, actors were found to be benevolent and to show good will in the way they are collaborating and cooperating with others.

Still, the analysis also shows that interactions and relationships among niche actors and between niche and regime actors are not strengthened or stabilized (yet). Within the niche, interactions function well. The linkages between niche and regime, however, exhibit less stability and are highly dependent on individuals. There were also some absent interactions or inconsistencies in the interactions, which further proves that interactions and relationships are not standardized or stabilized.

The research also identified some landscape factors or developments, which were very important in the actors' perceptions of climate awareness. Most importantly, the FFF movement was identified as a significant positive development. While the movement and demonstrations came to a halt during the (ongoing) COVID-19-pandemic, which itself was viewed as a critical and negative influence, many actors saw FFF as an opportunity and a push for CP, especially when it comes to exerting pressure on politicians. Table 16 summarizes these most significant drivers and barriers in a short overview and comparison.

Drivers	Barriers
Hands-on approaches and fostering feelings of self-effective Orientation / guidance for schools through CPPs Increasing normative pressure on decision-makers Growing awareness for CP in society Positive interactions and support among CPP actors FFF	Inherent rigidity of the school system Complexity of existing political processes Deep-set normative practices and role dynamics Schools marginalized / unappreciated in policy-making and society Lack of coherent political willingness and actions No CP (orientation) in core curricula or lesson contents Complexity of CP Challenging CP discourse COVID-19-pandemic

Table 16: Overview of the most significant drivers and barriers.

6 Discussion

6.1 Interpretations and Implications of the Results

6.1.1 Overview

This thesis analyzed the German school system and its complex structures, practices, rules, and interactions. Hereby, the findings provide new insights to the existing body of knowledge and the thesis contributes to the broader discourse on systemic change in the education system. Although studying transitions in the school or overall education context is a relatively new field in transition research, there are several important contributions from diverse disciplines and areas that are worth discussing in more detail.

Considering the current public debate and scholarly contributions, the following key findings and aspects are discussed below: the rigid regulative structures of the school system and the role of core-curriculum (6.1.2), the establishment of the *UNESCO Global Action Program on Education for Sustainable Development* (ESD) (6.1.3), the role of new approaches and participatory experiences for students (6.1.4), the fragmentation within the school and the opportunities of a *Whole Institution Approach* (6.1.5), the special role of teachers (6.1.6), and, lastly, the significance of schools for society (6.1.7).

6.1.2 Transforming Regulative and Structural Aspects of the School System

The present research shows that there is a need to address and overcome the rigid, regulative structures and practices of the school system, which hinder a more profound integration of CP. Among these, the systemic lack of funding and investments into schools as well as the procedures for the curricula development represent major difficulties. These findings are significant in that they point to the structural and systemic nature of the challenges that the school system is faced with. This is particularly important considering that potential transition processes, eventually, amount to the destabilization of structures and practices that have prevailed so far.

In the case of the German school system, the existing dominant structures have provided guidance and reliability for high quality education, but, at the same time, they make radical change extremely difficult. Therefore, Otto et al. suggested that transitions ("social tipping dynamics" (2020, p. 2356)) in the school system need time and gave an estimation of ten to twenty years. This means that the transition towards climate awareness and the profound integration of CP in the school system may well take a whole other generation (of students), or even two.

Von Seggern (2018), while touching upon the diffusion of ESD, also discussed the challenges of the strong top-down logic and complex communication and authority structures in the school system, which are often associated, at least in part, with the cultural sovereignty of the constituent states

in matters of education policy. This federalist principle of cultural sovereignty is important in transitions as it is “an acknowledgement of the regional structure which has evolved through Germany's history and is an element in the division of power and also, in a democratic state, *a guarantee of diversity, competition and community-based politics*" (Eckhardt, 2019, p. 11, researcher’s emphasis). This highlights the fact that developing joint strategies in the German school system is extremely difficult and change, if at all, will be heterogeneous. Most importantly, however, it shows that individual schools can hardly make a profound impact for the transition of the school system, and all this suggests that transitions are, in fact, highly political and legislative matters, which are deeply rooted in the federal structures of Germany.

Resulting from this is the strong need for political actions, not only in terms of demonstrating political willingness and formulating coherent strategies, but also with the hope that political actions would result in better and more substantial funding and investments for schools. Problems, so far, often include diverging political priorities, party politics, lack of cooperation, and a competitive environment (Deleye et al., 2019; Hoinle et al., 2021). Although these articles analyzed diverse educational contexts[15], this is an emerging trend that may also hold true for the German school system.

6.1.3 Establishing *Education for Sustainable Development*

In the context of political action, the recent establishment of the guidelines on ESD (for curricula development) throughout several German constituent states becomes more significant. The results of this research show that approaches to integrate CP into the school are often associated with ESD and the respective guidelines for curricula development are, therefore, very important for several actors.

These guidelines emphasize a more holistic approach to SD, but, still, they can be integrated gradually into structures or practices of the school and curricula development, marking their potential to rectify existing struggles in education policy. Hereby, ESD goes beyond what has been studied in this research (beyond integrating CP) and it is comprised of many complex characteristics:

- Addressing relevant current social, political, or economic issues,
- Analyzing issues from multiple dimensions and perspectives,
- Applying systems thinking,
- Dealing with uncertainties, contradictions, risks, conflicts of interest, and dilemmas and

[15] Both articles studied approaches to sustainability transition in the context of higher education systems.

- Fostering independent, autonomous, and participative learning processes (MSB 2019).

The potential of ESD is, therefore, above all, its strategic orientation and the tangible concept of what the integration of CP, amongst other topics, could look like. Considering the results of the present study, which reveal a lack of strategic orientation in both the immediate school context as well as in the political agenda, the guidelines on ESD could present an important opportunity.

Implementing reforms in line with ESD and, thereby, embedding CP into school curricula is not only an appropriate measure, but given the magnitude and urgency for SD, it must be one with top priority. What is more, von Seggern (2018) suggested that the implementation or at least the consideration of ESD could be interpreted as a political gesture of support and could potentially free up further resources (e.g., financial or personnel) for schools to benefit from. Nevertheless, given that ESD is not a brand new concept and has, in fact, received substantial institutional support over the years (MSB 2019), it is astonishing that it has only had such few effects on current educational practices and in schools.

6.1.4 Introducing New and Participatory Approaches for Students

In the meantime, it is appropriate to consider novel approaches to learning and to integrating CP in the school. As the present study shows, there is a need to try out new methods, tools, and ways of learning and to carefully consider which approaches and how they could be successful. Stoltenberg and Burandt (2014) discussed the potential of informal learning as part of climate education. According to the authors, this informal way of learning can be beneficial when new insights are gathered through ordinary and daily experiences. While these everyday situations may provide only incidental experiences with CP, other informal activities may be advantageous as well, such as voluntary activities, working groups, and other afterschool activities. Hereby, the school provides a fitting context and participants discover and develop new knowledge and competences (Stoltenberg and Burandt, 2014). This is underlined by Otto et al. (2020) who pointed out that sustainability cannot be imparted or imposed, but it must be learned and understood.

In light of this, active and participatory experiences for students and fostering feelings of self-efficacy become key determinants for climate awareness and resulting possible behavior change (Corner et al., 2015; Hamann et al., 2021; Nawothnig, 2022). For this, it is essential to provide suitable entry points for young adults and students in particular. Hoinle et al. (2021) emphasized this in their study and characterized successful activities as being based on co-design and working together on equal footing (original German quotation: “auf Augenhöhe” (2021, p. 11)) as well as fostering mutual trust, personal contact, and openness on both sides. The CPPs and the actor’s

relationships that were analyzed in the present research give positive and promising examples of this. Overall, these approaches can provide powerful real-world and hands-on experiences (Hoinle et al., 2021; Rostock, 2021). Otto et al. further highlighted the benefits of "transforming schools into living laboratories" (2020, p. 2361).

As a result, schools (and the respective governing institutions) need to place even more emphasis on the children and students. Such an argument was made by an important advocate of the transformation in the German school system, Margret Rasfeld, stating (researcher's translation): "Das Kind steht im Mittelpunkt und nicht der Stoff" (Deutsche UNESCO-Kommission (DUK), 2018). Furthermore, the overwhelming complexities of SD and the school system itself should not diminish efforts, instead, it is crucial for the institutions and the individuals involved not to lose sight of strategic goals and motives. Overall, it can be asserted that new formats, action-oriented learning, and a focus on developing competences, rather than on accumulating knowledge, present encouraging solutions for future developments.

6.1.5 Implementing a *Whole Institution Approach*

The above-mentioned considerations all point to the fact that changes in the school system must be complex and all-encompassing, and innovative approaches are needed that question the established "grammar of schooling" (Deleye et al., 2019, p. 1116). One point of departure for this could be to overcome the inherent fragmentation of the school system. Many scholars agree that this kind of fragmentation of school aspects into individual subjects is not suitable for addressing CP or SD altogether (Deleye et al., 2019; Rostock, 2021; Stoltenberg and Burandt, 2014; von Seggern, 2018). Deleye et al. (2019) identified this as a problematic tendency of compartmentalizing teaching and educational institutions altogether. Resulting from this strict focus on individual subjects, the interactions with CP topics are often limited to monodisciplinary, singular approaches and they fail to address the complexity of SD.

Overcoming this fragmentation can be a challenge, especially in a system that is shaped by complex, hierarchical structures, as also suggested by this study. But an opening of the school can occur incrementally, for example, by opening up the physical places for learning. As Holzbaur (2020) suggested, widening the scope for formal and informal learning has an important part in ESD and in transforming education. Similar to informal learning and incidental experiences proposed above, this bears the potential for students to think outside the box, to make new observations and associations.

Overall, pursuing a *Whole Institution Approach* (WIA) presents a distinctive and promising strategy. As the name suggests, the WIA describes an approach that is often discussed in the context of ESD and that proposes a holistic view of learning and schools as institutions (von Seggern, 2018). In

light of the rising number of all-day schools in Germany[16], the WIA may offer promising solutions (ibid). The WIA further underscores that implementing CPPs alone cannot transform schools. The transition towards more climate awareness in the school system requires much more holistic considerations and ambitions. According to Rostock (2021), implementing a WIA could provide the necessary guidelines and principles for the various school actors to follow through and participate. Schools could benefit from coherent guidelines on what it means to implement CP, students could benefit from reformed curricula that address current challenges, and all school actors could foster partnerships and benefit from long-term strategic investments, e.g., in school infrastructure.

6.1.6 Addressing the Special Role of Teachers

A special (and challenging) role in the transition towards climate awareness is attributed to teachers. They are often already overburdened with tasks and expectations in the school and (feel) ill-prepared to take on CP as an additional task. Nevertheless, as the results suggest, teachers are often initiators, motivators, advocates, facilitators, and partners for CPPs. This is echoed by other scholars who point to teachers as key actors with important responsibilities in transforming the education system and as actors who often go beyond their usual role driven by a strong intrinsic motivation (Hoinle et al., 2021; Otto et al., 2020). While this is certainly a positive development, such a level of personal motivation can hardly be sustained on a long-term basis. Therefore, it becomes vital to create a better support system, so that teachers can fulfill their role at the school. The reform of teacher education programs and the coherent representation and integration of CP are very important points of departure (Rostock, 2021; von Seggern, 2018).

6.1.7 Emphasizing the Significance of the School for Society

Overall, the thesis shows that the role of schools in society must be better emphasized. This alludes to the fact that a transition in the school system, regardless of CP, is vital. And as Otto et al. (2020) pointed out, schools and education are highly significant for taking radical climate action and for achieving SD.

The results further indicate that schools need to be strengthened and supported in taking on this new, more prominent role and in becoming a more active member of society. Such support could stem from institutionalizing cooperation with non-school partners or from creating stronger platforms that facilitate exchange (Forum Bildung Digitalisierung e.V., 2020;

[16] All-day schools in Germany are schools, which supervise students throughout the entire day and, by this, encompass and combine many more aspects and interactions for students (and for CP) than only the learning or classroom scope.

Rostock, 2021). To achieve this, it is essential to allow access to schools, to open up the metaphorical black box of schools, and to change the culture of how schools are perceived and appreciated in society.

6.2 Critical Reflection and Limitations

6.2.1 Biases and Limitations of the Chosen Methods

As in all research endeavors, biases and subjectivity cannot be avoided altogether. First of all, this thesis was a direct contribution and cooperation with the S4F project. Given the personal connections and the in-depth work with members of the project team, the thesis at hand may reveal some biases towards achieving the goals and ambitions of S4F and the neutrality of the researcher may have been affected.

Furthermore, the goal of the research was to provide a qualitative and focused analysis of certain aspects and dynamics of the school system. Hereby, the research relied on a limited sample of interviewees and, moreover, on the actors' perceptions and subjective interpretations of climate awareness and CPPs. While this was deemed appropriate for the overall goal and for gaining qualitative insights, this thesis makes no claim of being representative or exhaustive of the German school system. Potentially, a larger sample of interviewees could have allowed to make more comprehensive claims. Furthermore, additional methods, such as systematic analyses of policy and legal documents, could have complemented the results and their implications.

Finally, as the qualitative content analysis revealed, the interviews generated a vast amount of data regarding numerous aspects of climate awareness and CPPs in the school system. In the experience of the researcher, however, many data segments and especially some deductive codes proved to divert and they were considered less significant to the research objectives (such included data on concrete and implemented activities of CPPs with the corresponding codes: (INTER)ACTIONS\Activities and TECHNOLOGICAL ARTIFACTS / INFRASTRUCTURE). These codes had been developed beforehand and deductively, i.e., in line with the determined theoretical backgrounds. In light of this, it may be effective to employ different coding techniques for research fields similar to this one, which could ensure a more nuanced, but equally fitting analysis.

6.2.2 Reflection on the Multi-Level Perspective Framework

This thesis applied the MLP as an analytical framework. While it offers a suitable tool to study transitions and socio-technical systems, it is not without criticism and there are ongoing scientific debates on several issues regarding its operationalization. Amongst others, the issues include the lack of methodological coherence in its application, the bias towards bottom-up innovations, the actor concept and agency, as well as the (appropriate)

operationalization of the analytical levels (Geels, 2019, 2011; Smith et al., 2010). Smith et al. (2010) further stressed the tradeoffs between adequately addressing socio-technical complexities and abstracting from them. In working with the MLP in this thesis, some of the same challenges were encountered.

With regard to the actor concept, it became apparent that the MLP itself provides little guidance on classifying, characterizing, and structuring actors. This was noted in the analysis of the actors and in the difficulties to assess these relationships. While the notion of rules provides a tool through which interactions and practices can be conceptualized, it is still a rather vague concept and require further distinct definitions. Given the overall complexity, a degree of specificity towards actors was compromised during the research. Geels addressed this criticism as well and proposed ways of handling actors and the notion of their agency, e.g., by introducing elements of power (Geels, 2011; Geels and Schot, 2007; Grin et al., 2010). Other researchers proposed to incorporate additional concepts into the analyses (e.g., actor-network-theory, actor-centered institutionalism or multi-level constellation analysis (Best, 2019; Genus and Coles, 2008)) to complement the MLP and to be able to better characterize actors, which could have been useful in this present research as well.

The MLP is meant to be used as a framework to analyze socio-*technical* processes. Thereby, it underlines the notion that social and technological aspects are inherently interconnected. While technological artifacts and infrastructure are certainly important for a sustainability transition in the school system (e.g., given the urgent need to refurbish old school buildings, to reduce energy usage, or to invest in renewable energies), this did not play a key role in the present research. Instead, the focus lied on social practices and innovations hereof and in addressing qualitative socio-institutional factors in the interactions between various actors; as a result, the technological perspective was made somewhat redundant.

Another challenge of operationalizing the MLP lied in defining the system boundaries and adhering to the complexity of socio-technical systems. As Geels (2011) suggested, the use of the MLP as a heuristic device requires substantial knowledge of the empirical domain, theoretical sensitivity, and, inevitably, leaves elements of creative interpretation. In the research at hand, the operationalization of the MLP presented challenges, for instance in applying and defining the rule dimensions. It quickly became apparent that the dimensions of regulative, cognitive, and normative rules entail a variety of aspects and concepts. At the same time, these could not easily be broken down into tangible factors or indicators (also due to the fact that the MLP literature is vague about this aspect). Therefore, at this point of the analysis in particular, the abovementioned sensitivity and interpretative capacity was required; naturally, biases or variances cannot be fully excluded.

In part, these challenges also lied in defining system boundaries and delineating the niche and regime level. While the need for these definitions in the research on niche-innovations and socio-technical transitions is clear, in

many cases, this distinction and the linkages between these two analytical levels can become difficult or ambiguous (Hölsgens et al., 2018), as was also the case in the present research. For such cases, some researchers call the usefulness of the MLP into question and come to the conclusion that if niches do not actually interact or challenge the established regime, then, "these individual initiatives, promising as they may be [...], can hardly be analyzed individually along the line of an MLP-heuristic and the transition perspective" (Hölsgens et al., 2018, p. 10). While this is a drastic statement, it is important to consider and, in future research, it may still prove useful to apply the MLP in a more open and collaborative approach. Also due to this complexity and risk of ambiguity, this could improve the reliability of the data, for example, by drawing upon diverse groups of experts and researchers for conducting or monitoring the data analysis.

7 Conclusion and Outlook

7.1 Summary and Conclusion

The severity of the climate change demonstrates the urgent need for action towards SD and for radical changes in the way humans interact with their environment and within society. Also given the complexity of it all, there continues to be a need to address and analyze this using appropriate frameworks. Therefore, the present research utilized the socio-technical approach to transitions and the MLP framework to address the significant gap of knowledge on sustainability transitions in the school system. By this, it underlined the importance of studying the implications of SD for educational institutions.

The thesis analyzed the German school system and different aspects of climate awareness in the school context from the point of view of actors involved in CPPs (as an example of niche activity). More specifically, the goal was to identify drivers and barriers for a potential transition process towards more climate awareness. Hereby, it addressed the research question: *How do actors in climate protection projects perceive drivers and barriers for transitioning towards more climate awareness in the German school system?* This research objective was complemented by two sub-questions, which highlighted the significance of regulative, cognitive, and normative rules in socio-technical systems as well as the structuration and interactions of key actors. By conducting a qualitative research approach and by operationalizing the MLP framework, the thesis provides a comprehensive analysis of German schools in the context of CP and climate awareness.

The results of this thesis show that the German school system is constituted by a variety of important structures and practices, many of which hinder the more systemic integration of CP. Most importantly, the school system is characterized by an innate rigidity and complex political processes. Deep-set normative practices, role dynamics, and an unappreciated role of schools in society are further barriers for the transition towards more climate awareness. However, increasing public pressure and an overall growing awareness in society provide promising outlooks and may induce change. The results also highlight the crucial need for a strategic orientation and for taking the right approach towards integrating CP in the school system. Hereby, CPPs have important potential as they offer valuable hands-on approaches and experiences of self-efficacy for students. Interactions within these niche projects are not standardized, highly dependent on individuals and reveal some inconsistencies, nor are there stable or reliable linkages to regime actors and dominant practices yet. Nevertheless, CPPs are carried by actors who are highly driven and motivated in the way they are engaging with the topic, collaborating with each other, and contributing towards integrating CP into the school context.

In conclusion, the results of this thesis point to the fact that the German school system is very rigid and inducing change is extremely difficult. While CPPs have the potential to drive change and raise awareness in individual

cases or schools, much more substantial efforts and initiatives are necessary. Highly motivated individuals and niche actors play an important role in this and represent key drivers for such developments.

In order to trigger a transition towards more climate awareness in the system overall however, CP needs to be addressed more systematically while adhering to the complexity of SD. This show that SD and CP cannot be integrated in the school context with individual projects; rather, holistic approaches and reforms are required. Here, the ongoing discourse on ESD and of reforming the key aspects of the school system play a much more significant role and offer a promising outlook.

7.2 Future Research Outlook

In light of this, future research should be directed towards further developing the MLP. Still given the relative novelty of the framework, research should focus on the developing actor concept and investigating niche-regime interactions. This thesis actively sought out niche perspectives, but it may be insightful to analyze: Who are the actors outside the niche and what are potential developments opposite niche-innovations? Other research questions could be: How do actors outside of the niche behave and relate to the integration of CP? Who stands to benefit to keep the school system as it is? How do niches interact with the respective regimes and how can the regime be destabilized?

This coincides with the need to better understand structural barriers of the regime. While this study showed that actors perceive regulative rules and structures to be important hindering factors for the transition for climate awareness, many aspects remain to be fully understood. What makes these structures so rigid and inflexible? How can they be transformed? What could a transition pathway for the school system look like?

In general, this thesis, while addressing the gap of knowledge on transitions in the school system, it showed that much more and comprehensive qualitative and quantitative research in the field of schools is necessary. In the face of the urgency of climate change and its relevance for the young generation, this must be a priority.

Future research could, therefore, focus on various other interesting fields of study, for example: investigating role dynamics among school actors from sociological or psychological perspectives, analyzing the legislative implications of reforms of the school system, or conducting a policy analysis on the effectiveness of CP-related policies or of political support for CPPs. Also, given the prominence of ESD, it is essential to draw much closer attention on how the integration of such profound and reformative programs will proceed in the future. This may prove insightful, not only in terms of implementation at the schools, but also in science and the public discourse and in terms of whether such programs have the potential to raise climate awareness and to create a more universal approach to CP for the school system.

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Appendix I: Interview Guidelines

i. Interview Guideline: Actor Group Political / Administrative

Einstieg:
Stellen Sie sich doch einmal kurz vor: Wo arbeiten Sie? Wie lange sind Sie schon dort?
Was macht Ihre tägliche Arbeit aus? Was sind Ihre Aufgabenschwerpunkte?

Wo kommen Sie in Ihrem Arbeitsalltag mit Klimaschutz in Berührung?

Themenblock: Klimaschutz / Aktivitäten
Wie nehmen Sie das Feld Klimaschutz an Schulen wahr?
- Welche Aktivitäten kennen Sie in diesem Zusammenhang? (Projekte, Initiativen, Programme)

Wie wichtig sind einzelne Projekte wie z.B. „Energie gewinnt“?
- Was können solche Projekte erreichen?
- Welche Verantwortung hat der Schulträger?

Was ist denn der Schlüssel, um Klimaschutz zu erreichen?
- Bestimmte Themen? Welche Akteure? Bestimmte Methoden, Ansätze?

Welche Hürden oder Schwierigkeiten sehen Sie dabei?

- Wenn es um die Umsetzung geht
- Auch Finanzierungen
  [probe: z.B. Bürokratie, Rechtliches, Versicherungen, langfristige Finanzierungen]

Stichwort Investitionen: gibt es einen politischen Willen und Tatkraft, Investitionen zu tätigen, um den Klimaschutz an Schulen voranzutreiben?

Themenblock: Kooperation + Netzwerke

Wie funktioniert die Zusammenarbeit und der Austausch mit Ihnen und den versch. Akteur:innen zum Klimaschutz?
- Mit wem sind Sie wie im Austausch? Wer ist besonders wichtig?
- Wie zufrieden sind Sie damit?

Wie denken Sie über die Fridays-for-Future Bewegung?
- Glauben Sie, diese Bewegung hat etwas verändert?
- Gab es andere wichtige äußere Einflüsse, die etwas in Gang gebracht haben?

Themenblock: Schulentwicklung + Transition
Welche Strategien gibt es, um wichtige Zukunftsthemen anzugehen?
- Was sind die wichtigsten Themen / Herausforderungen für Schule?

Welche Anreize brauchen das Schulsystem und die Personen dort?

Bietet das Schul-/Bildungssystem gute Voraussetzungen für die Entwicklungen der Zukunft?

- Oder muss sich das Schulsystem (von Grund auf) erneuern?
- Braucht es mehr Innovationen? Welche Beispiele würden Ihnen da einfallen?

Abschluss

Wenn sie ein Plädoyer abgeben müssten in Sachen Klimaschutz an Schulen:

- An wen wäre das gerichtet und was würden Sie sagen?

Wie stellen Sie sich das Schulsystem / die Schule in 20 Jahren vor?

Gibt es von Ihrer Seite aus noch etwas, das Sie gerne einbringen oder erzählen möchten?

ii. Interview Guideline: Actor Group Network Partners / Interest Groups

Einstieg

Stellen Sie sich doch einmal kurz vor: Wo arbeiten Sie? Wie lange sind Sie schon dort? Was sind Ihre Aufgabenschwerpunkte? Was haben Sie vorher gemacht?

Welchen Zugang haben Sie in Ihrem Arbeitsalltag zum Thema Klimaschutz?
Und zu Schulen?

Themenblock: Klimaschutz / Aktivitäten

Wie nehmen Sie das Feld Klimaschutz an Schulen ganz allgemein wahr?

- Welche Aktivitäten kennen Sie in diesem Zusammenhang? (Projekte, Initiativen, Programme)
- Wo sehen Sie Schulen auf dem Weg zu mehr Klimaschutz?

Hat sich das Interesse an solchen individuellen schulischen Projekten verändert?

- Im gesamtgesellschaftlichen Diskurs (Bezug: FFF ?)
- Wie, aus wissenschaftlichen Kreisen?

Was ist, Ihrer Meinung nach, der Schlüssel, wenn es um Klimaschutz geht?

- Bestimmte Themen?
- Welche Akteure?
- Bestimmte Methoden, Ansätze?

Welche Hürden oder Schwierigkeiten sehen Sie dabei?

- Wenn es um die Umsetzung geht
- Auch Finanzierungen
  [probe: z.B. Bürokratie, Rechtliches, Versicherungen, langfristige Finanzierungen]

Themenblock: Kooperation + Netzwerke

Wie funktioniert die Zusammenarbeit mit Ihnen und den versch. Akteur:innen zum Klimaschutz?

- Mit wem sind Sie wie im Austausch? Wer ist besonders wichtig?

Fühlen Sie sich ausreichend unterstützt? Zufrieden?

- Gefördert / finanziert?
- Wünschen Sie sich von bestimmter Seite mehr Unterstützung?

Welche Art der Unterstützung brauchen die Schulen? (Allgemein und von Ihnen?)

Themenblock: Schulentwicklung + Transition

Wie würden Sie individuelle und schul-basierte Projekte im Kontext von BNE einordnen?

- Wie wichtig sind sie, um Nachhaltigkeit/Klimaschutz zu „erreichen“?
- …oder „Tropfen auf den heißen Stein“?
- Welche Rolle/Bedeutung schreiben Sie dem Kernlehrplan zu?

Was sind (andere) wichtige Zukunftsthemen für Schulen?

Wie würden Sie die Strategien beurteilen, die diese Zukunftsthemen umsetzen möchten?

- Staatlich / politisch…
- Von den Schulen…

Welche neuen Entwicklungen sehen Sie schon jetzt im Schulsystem?

- Welche Anreize brauchen Schulen und die Personen, die sie mit Leben füllen (Schüler:innen etc.) ganz konkret?

Das Thema „Innovation“ im Zusammenhang mit Schule – wie würden Sie das beschreiben?

- Einmal ein bisschen provokativ gefragt: Muss sich das Schulsystem (von Grund auf) erneuern?

Abschluss

Wenn Sie ein Plädoyer abgeben müssten, für Klimaschutz an Schulen, was würden Sie sagen? Und an wen wäre das gerichtet?
Wunsch / Vision / Schule in 20 Jahren….

Gibt es von Ihrer Seite aus noch etwas, das Sie gerne einbringen oder erzählen möchten?

iii. Interview Guideline: Actor Group Students

Einstieg

Stell Dich einmal kurz vor: Wer bist Du? Wie alt bist Du? In welche Klasse gehst Du?

Wie hast du angefangen, Dich für den Klimaschutz zu interessieren und darüber zu lernen?

Themenblock: Klimaschutz / Aktivitäten an Schule

Wie oft wird im Schulunterricht über das Thema Klimaschutz gesprochen?

- Hast du dadurch etwas Neues gelernt?
  (Oder kanntest Du Dich schon vorher damit aus?)

Was macht Deine Schule, um einen Beitrag zum Klimaschutz zu leisten?

- Gibt es an Deiner Schule noch andere Aktivitäten zum Klimaschutz (AGs, Projekte etc.)?

Was hat Dich motiviert, mitzumachen?

Was empfindest Du als demotivierend / entmutigend?

Unterthema: „Energie gewinnt“

Kennst Du das Projekt „Energie gewinnt“?

Weißt Du, was mit den Geldern an Deiner Schule gemacht wurde?

- Falls nein: Warum nicht?

Hast sich Dein Verhalten dadurch verändert?

Glaubst Du, das Projekt hat an Deiner Schule etwas verändert?

Themenblock: Kooperation + Netzwerke

Wie ist es für Dich als Schülerin außerhalb des Unterrichts mit Lehrkräften und anderen Personen zusammenzuarbeiten?

Was empfindest du dabei als besonders gut/wichtig?

Was funktioniert nicht gut?

Wie denkst Du über die Fridays-for-Future Bewegung?

- Hast Du das Gefühl, diese Bewegung hat etwas verändert?
- Stichwort: äußere Einflüsse

Abschluss

Was wünscht Du Dir für Deine Schule?

Gibt es von Deiner Seite aus noch etwas, das Du gerne einbringen oder erzählen möchtest?

iv. Interview Guideline: Actor Group Teachers

Einstieg

Stellen Sie sich doch einmal kurz vor: Was unterrichten Sie? Wie lange sind Sie schon als Lehrer:in tätig, wie lange schon an der Schule?

Was macht Ihre Schule, um einen eigenen Beitrag zum Klimaschutz zu leisten?

- Falls konkrete Projekte: Wie sind diese Projekte entstanden?
  probe: Schwenker zur Schule, konkret

Themenblock: Klimaschutz / Aktivitäten an Schule

Wie viel Raum gibt im Schulunterricht für das Thema Klimaschutz?

- Wie viel Raum gibt es im weiteren Schulalltag dafür, z.B. in AGs, Projektwochen?
- Halten Sie das für ausreichend?

Welchen Ansatz verfolgt ihre Schule dabei?

- Themen, Ziele, Ergebnisse…
- Motive, Ambition…
- Didaktik, Methode…

  probe: z.B. Mobilität, Heizung, Strom, Ernährung, Recycling…?

Was steht im Vordergrund, Wissensvermittlung vs. Engagement/Initiativen fördern, …?

Was bewegt Sie persönlich, sich daran zu beteiligen? (würde Sie dazu bewegen?)

- Was, glauben Sie, bewegt Ihre Schüler:innen zu ihrem Engagement?
- Was empfinden Sie als demotivierend / entmutigend?

Unterthema: „Energie gewinnt“

Welche Rolle spielt das Thema Energie an Ihrer Schule?

- Warum? Z.B. da leicht zugänglich, besonders wichtig?

Wie präsent ist dieses Projekt im Schulalltag?

- Bei Ihnen selbst? Bei Ihren Schüler:innen?

Ist Ihnen / den Schüler:innen bekannt, was bisher mit den Geldern an Ihrer Schule gemacht wurde?

- Falls nein: Warum nicht?
- Würde es die Motivation / das Engagement steigern, wenn dies transparenter wäre?

Glauben Sie, kann das etwas an Ihrer Schule „in Gang setzen“?

- Welches Potential sehen Sie hinter diesem Projekt?
- (Hat es vielleicht schon etwas verändert?)
  probe/Stichwort: Verhaltens-Veränderungen

Themenblock: Kooperation + Netzwerke

Wie funktioniert die Zusammenarbeit mit den versch. Akteur:innen zum Klimaschutz an Ihrer Schule?

- Wie zufrieden sind Sie mit dem Austausch?

Wer oder was setzt dabei wichtige Impulse?

Wer oder was ist treibende Kraft, wenn es um Klimaschutz an Schulen geht?
- Wie denken Sie über die Fridays-for-Future Bewegung?
- Glauben Sie, diese Bewegung hat etwas verändert?

Themenblock: Schulentwicklung + Transition

Gibt es Projekte / Initiativen / Ansätze zu Veränderungen / Neuerungen an Schulen, die Sie besonders gut finden?
- Beeindruckend, besonders erfolgreich….
- Warum genau diese? / Was zeichnet diese aus?

Glauben Sie, dass sich diese Ideen in Ihre Schulalltag integrieren lassen?
- Wenn ja, wie? Wenn nicht, warum nicht? Woran scheitert es?

Wie viel Raum gibt es, Ihrer Meinung nach, für „Ganz Neues“ oder „Innovatives“ an Ihrer Schule?
- Neue Ideen wie Aufhebung der Fächerstruktur, Schule neu denken, neue Formate, neue Lernorte…

Abschluss

Wenn sie ein Plädoyer abgeben müssten in Sachen Klimaschutz an Schulen:
An wen wäre das gerichtet und was würden Sie sagen?

Was wünschen Sie sich konkret für Ihre Schule in der Zukunft?

Gibt es von Ihrer Seite aus noch etwas, das Sie gerne einbringen oder erzählen möchten?

Appendix II: Statements According to Inductive Codes and by Actors

Statements about:		Total no. of statements[17]: 933	Statements by ACTORS										
Clusters:	Topic-related Category:	No. of state-ments per category	ADM1	ADM2	ADM3	IG1	IG2	IG3	STU1	STU2	TE1	TE2	TE3
Approaching CP	Approach to CP	42	X	X	X	X	X	X	X	X	X	X	X
Approaching CP	Reaching young people	7	X			X		X		X	X		X
CPPs concrete	CPP implementation	62	X	X	X	X	X	X	X	X	X	X	X
CPPs concrete	CPP visibility / perception	31	X			X		X	X	X	X	X	X
Experience + motivation	Hands-on experience	20		X		X	X	X		X	X		X
Experience + motivation	Impact and motivation	42	X	X	X	X		X	X	X	X	X	X
Experience + motivation	Intrinsic motivation	42	X	X	X	X	X	X	X	X	X	X	X
Interpersonal aspects	Being collaborative	28	X	X		X	X	X	X	X	X	X	
Interpersonal aspects	Communication	20	X	X			X		X	X		X	X
Interpersonal aspects	Individuals taking initiative	23		X		X		X		X	X	X	X
Interpersonal aspects	Student-teacher-relation-ship	14						X	X	X	X		
Interpersonal aspects	Support	22	X	X					X	X	X	X	X
Interpersonal aspects	CPP participants / coop.	59	X	X	X	X	X		X	X	X	X	X
Organization + struc-tures	Subject structure	18		X		X	X			X	X		X
Organization + struc-tures	Heavy workload	23				X	X	X		X	X	X	X

Overall Discourse	Awareness	71	X	X	X	X	X	X	X	X	X		X
Overall Discourse	Public discourse	18		X	X		X	X	X	X		X	
Political financial aspects	Public budget	27	X	X	X		X	X		X	X	X	
Political financial aspects	Funding practices	3					X						
Political financial aspects	Funding programs	6	X			X		X					
Political financial aspects	Systemic shortcomings	21		X	X		X	X	X	X	X		
Political financial aspects	Teacher/personnel shortages	6				X	X					X	
Political strategic aspects	Political agenda	34	X	X	X	X	X	X	X	X	X	X	X
Political strategic aspects	Political processes	21		X	X		X		X	X	X		
Political strategic aspects	CP as a strategy	21	X	X		X	X	X			X	X	
School system	Coordination	23				X	X	X					
School system	School spaces	9						X		X			X
School system	School system + structures	55		X	X	X	X	X		X	X	X	X
Teaching focus	Outside expertise	24				X	X	X				X	X
Teaching focus	Curriculum	113	X	X	X	X	X	X	X	X	X	X	X
Teaching focus	Teacher education	20		X		X	X	X		X	X		
Teaching focus	Teachers' role	8		X		X		X			X		X

Table A. 1: Statements according to inductive codes and by actors.

[17] This number excludes statements with the classifications ACTORS and LANDSCAPE FACTORS.

Appendix III: Summaries of Topic-Related Categories

Cluster: Approaching CP

Category Summary: "Approach to CP"				
Main Messages	**Notes / Explanations**	**Driver / Barrier**	**Rule Dimension**	**Analytical Level**
Avoid prohibitions or banning things	No "moralizer" Try not to discourage people Inform, not criticize Alluding to behavioral patterns, reaction patterns	BAR	COG NORM	Niche
Go about CP with concrete student-oriented activities / approaches	"Lebensrealität aufgreifen" Pick up students mindsets, beliefs, interests Appeal to mindsets Consider new ideas In the past / status quo: risk of patronizing, do not let adults take over but let students experience themselves	DRIV BAR	COG	Niche Regime
Realistic / differentiated approach / address complexity	Give participants free / independent choices, let them decide for themselves (what to implement, how to spend money, e.g.) Take differentiated approach Address complexity, otherwise activities or CPPs at risk of becoming haphazard	DRIV BAR	COG	Niche
Everyone can take small steps	Be realistic, not expect too much Show schools the role they can play, encourage action, values Mindsets	DRIV	NORM COG	Niche
Motivation or commitment do not necessarily have to be intrinsic or voluntary	Different belief systems, mindsets of people regarding CP (see "intrinsic motivation" for contrary indications)	DRIV	COG	Niche
Not take an idealistic approach	No "moralizer" Role of idealism Risk of not being taken seriously by students (in the past)	BAR	COG	Niche

Table A. 2: Category Summary "Approach to CP".

Category Summary: “Reaching young people”				
Main Messages	**Notes / Explanations**	**Driver / Barrier**	**Rule Dimension**	**Analytical Level**
Important not to except perfection		BAR	COG	Niche
School can raise awareness early on	Specific kind of access to young people Potential to raise awareness in the right settings	DRIV	COG	Niche Regime
Provide realistic perspectives	Prepare young adults	DRIV	COG	Niche
School cannot easily motivate / mobilize young people	Difficulties of school as a public institution and its possibilities How school is viewed by young people	BAR	NORM	Niche

Table A. 3: Category Summary “Reaching young people".

Cluster: CPPs concrete

Category Summary: "CPP implementation"				
Main Messages	**Notes / Explanations**	**Driver / Barrier**	**Rule Dimension**	**Analytical Level**
Implementation of CPPs	Concrete activities, what, how it has been done	DRIV	- (interactions)	Niche
Not sufficient (effort for) CPPs	CPPs in Germany, e.g., not all representative Too many school authorities / municipalities do not offer anything to their schools	BAR	- (interactions)	Niche
Potential impact and importance of CPPs	Pressure on school authorities Giving incentives, new ideas, raising awareness Belief about impact and possible success of CPPs Also mentions impact on families, parents	DRIV	COG + interactions	Niche
Problems when/with implementing CPPs	CPPs can be too much work for the schools or school authorities Competition between schools Energy savings hard to retrace in some cases Potential impact on emission through more efficiency is very small, most impact comes from renewal etc. and lies in the responsibilities of the school authorities, not within the school and its actors	BAR	NORM REG + interactions	Niche
Topic variety and diverse approaches are important	Belief about impact and possible success of CPP	DRIV	COG + interactions	Niche

Table A. 4: Category Summary "CPP implementation".

Category Summary: “CPP visibility / perception”				
Main Messages	**Notes / Explanations**	**Driver / Barrier**	**Rule Dimension**	**Analytical Level**
Challenges in making CPP more known / increasing visibility	Sometimes not sufficient signaling effects No visibility beyond those involved Depended on how teacher is implementing CPP Role of individual, (im-)possible effects on behavior	BAR	COG NORM	Niche
Need and wish to make it more known / popular	Need for acceptance from other students in order to take measures Spread impact, awareness Aimed at increasing visibility Belief in success of CPP and its visibility	DRIV BAR	COG	Niche
Visibility S4F vs. EG	Depending on how implemented, topics addressed, reputation, name Generally, S4F seems to be more visible, better known, perceived as more holistic CPP EG rather small, focus on one single topic, smaller participant range Competition among schools, perceived as motivator	DRIV BAR	COG	Niche

Table A. 5: Category Summary “CPP visibility / perception".

Cluster: Experience and motivation

Category Summary: “Hands-on experience”				
Main Messages	**Notes / Explanations**	**Driver / Barrier**	**Rule Dimension**	**Analytical Level**
Need for active participation and live experiences	Not only abstract learning in class Experiencing something as opposed to learning from a book	DRIV BAR	COG + interactions	Niche
Become active themselves	Develop real competences Action-oriented, hands-on	DRIV	COG + interactions	Niche
Working constructively and more independently		DRIV	- (interactions)	Niche
CPP as a contrast to school routine		DRIV	- (interactions)	Niche

Table A. 6: Category Summary “Hands-on experience".

Category Summary: “Impact and motivation”				
Main Messages	**Notes / Explanations**	**Driver / Barrier**	**Rule Dimension**	**Analytical Level**
CPPs offer incentives and appreciation	Appreciation, incentives, and validation Belief about what is most efficient / useful	DRIV	COG	Niche
Feeling of self-efficacy, sense of achieving something	Having a sense of achieving something Knowing about the effects of actions taken	DRIV	COG	Niche
Becoming active in small and immediate environment		DRIV	- (interactions)	Niche
Risk of demotivation or frustration	Risk of demotivation, frustration is high Needs to be “broken” in order to motivate people Thinking positively, focusing on the small things and not on the complexity of it all	BAR	COG	Niche
Small and immediate success is important and can motivate		DRIV	COG	Niche

Table A. 7: Category Summary “Impact and motivation".

Category Summary: "Intrinsic motivation"				
Main Messages	**Notes / Explanations**	**Driver / Barrier**	**Rule Dimension**	**Analytical Level**
Established CP approach in certain professions	Referring to construction sector	DRIV	NORM	Regime
Guide and encourage students, let motivation grow		DRIV	COG	Niche
Motivation comes from within / topics close to students	Sometimes strong personal convictions, important not to be hypocritical (see "approach CP" for contrary indications)	DRIV	COG	Niche
Personal convictions / link attitude and profession		DRIV	COG NORM	Niche
Positive / optimistic personality		DRIV	COG	Niche
Very motivated, eager to do something, to contribute		DRIV	COG	Niche

Table A. 8: Category Summary "Intrinsic motivation".

Cluster: Interpersonal aspects

Category Summary: "Being collaborative"				
Main Messages	**Notes / Explanations**	**Driver / Barrier**	**Rule Dimension**	**Analytical Level**
Being open-minded	New roles for students in the overall discourse, not underestimating students Openness	DRIV BAR	NORM	Niche
Need for cooperation among different groups	Bringing everyone together at one table Realizing that cooperation is necessary	DRIV	COG	Niche
Need for more teamwork	Check how teamwork can be incorporated in school Discourage "lone fighters" Foster key competences	BAR	COG NORM REG	Niche
Working together, collaborating	Roles within new working groups, new dynamics	DRIV	NORM + interactions	Niche

Table A. 9: Category Summary "Being collaborative".

Category Summary: "Communication"				
Main Messages	**Notes / Explanations**	**Driver / Barrier**	**Rule Dimension**	**Analytical Level**
Equal and open communication		DRIV	- (interactions)	Niche
Good communication and exchange		DRIV	- (interactions)	Niche
More and better communication and exchange necessary	Within CPPs Sometimes communication channels are not clear, unknown	BAR	- (interactions)	Niche
Some hierarchical / organizational problems	In terms of responsibilities in school administration, also linked to busy workload of administrative staff	BAR	- (interactions)	Niche Regime

Table A. 10: Category Summary "Communication".

Category Summary: "Individuals taking initiative"				
Main Messages	**Notes / Explanations**	**Driver / Barrier**	**Rule Dimension**	**Analytical Level**
Avoid single person focus	Knowing and understanding that single person focus is / can be problematic Working on finding remedies for this Outlining problems of current ways of implementing CPPs	BAR DRIV	COG NORM	Niche
Initiative taken by teacher	Teachers who are motivated and driven	DRIV BAR	COG	Niche
Initiative / motivation from others	Motivation and interests from others Parents, janitors Others who want to be involved, are driven	DRIV	COG	Niche

Table A. 11: Category Summary "Individuals taking initiative".

Category Summary: "Student-teacher-relationship"				
Main Messages	**Notes / Explanations**	**Driver / Barrier**	**Rule Dimension**	**Analytical Level**
Abandoning traditional hierarchies and reservations	Abandon old authority structures Accept new roles	DRIV BAR	NORM	Niche Regime
Good and equal collaboration is important	Taking each other seriously For some harder than for others	DRIV BAR	NORM	Niche Regime
Knowing each other personally	Important, enabling factor	DRIV	COG	Niche

Table A. 12: Category Summary "Student-teacher-relationship".

Category Summary: "CPP participants / cooperation"				
Main Messages	**Notes / Explanations**	**Driver / Barrier**	**Rule Dimension**	**Analytical Level**
Cooperation among different groups	Working across different grade levels With different groups (teachers, students, parents, organizations, school authorities)	DRIV	REG + interactions	Niche
Good cooperation		DRIV	- (interactions)	Niche
Having responsibilities within CPP is motivational / meaningful	Wanting to do something for the class community Intrinsic motivation Especially for younger students	DRIV	COG	Niche
High level of commitment and mutual trust (necessary)	Students volunteer for CPPs Sometimes commitment and responsibility levels vary, can cause problems Generally, very good cooperation Trusting relationships Teachers who are motivated can have a huge impact on the commitment of students Teachers enjoy freedoms, school administration is supportive	DRIV BAR	COG	Niche
Students' age / grade level matters	Different commitment / motivation depending on age younger students generally more motivated Puberty is a factor Older students not as much interested in working groups	DRIV	COG	Niche
Participants	Variety of individuals participating working group structures explained	DRIV	- (interactions)	Niche
Parent participants	Role of parents Importance given to school	DRIV	NORM + interactions	Niche

Table A. 13: Category Summary "CPP participants / cooperation".

Category Summary: "Support"				
Main Messages	**Notes / Explanations**	**Driver / Barrier**	**Rule Dimension**	**Analytical Level**
Support and openness within the school	Most / a lot of support is coming from within the school Especially for CPPs or other activities From teachers and administration alike A lot of openness in schools Gestures of support	DRIV	COG	Niche
Support from outside actors		DRIV	COG	Niche
Not enough support	Not sufficiently realized how important CP is Not enough support for niche actors	BAR	COG	Niche

Table A. 14: Category Summary "Support".

Cluster: Organization and structures

Category Summary: "Subject structure"				
Main Messages	**Notes / Explanations**	**Driver / Barrier**	**Rule Dimension**	**Analytical Level**
New approaches and methods needed	How things are done / status quo is dismissed (tone) Referring to the role of schools and its responsibility towards students and to the role it has in society, how schools are viewed / (not) valued	BAR	NORM	Regime
Structure of separate, individual subjects	Procedures in school system Questioning of the existing procedures in school	BAR	REG	Regime
Very limited time available and no flexibility	Ideas and difficulties about how to go about CP	BAR DRIV	COG	Regime Niche

Table A. 15: Category Summary "Subject structure".

Category Summary: “Heavy workload”				
Main Messages	**Notes / Explanations**	**Driver / Barrier**	**Rule Dimension**	**Analytical Level**
CPPs are “on top” for teachers	Teachers working overtime Sometimes no capacities to be creative, system allows for only very little flexibility / creativity Official procedures / processes / structures at school	BAR	REG	Niche
Schools and administration have a lot to manage	Also due to COVID-19-pandemic A lot of tasks Very little spare capacities Sometime shard to get in touch with them	BAR	REG	Regime
Students under a lot of pressure	Also due to shorter school tracks (G8) A lot to do Motivation for extracurriculars lags behind Role that students have to fulfill + regulative aspects of school tracks	BAR	NORM REG	Regime
Teachers have a heavy workload	Role that teaches have to fulfill and how it is viewed (mostly negative)	BAR	NORM	Regime

Table A. 16: Category Summary “Heavy workload”.

Cluster: Teaching focus

Category Summary: "Teachers' role"				
Main Messages	**Notes / Explanations**	**Driver / Barrier**	**Rule Dimension**	**Analytical Level**
Teachers to become facilitators	Commitment necessary Willingness to try new things and methods, Accept the need to keep on learning Become facilitators, moderators, agents etc.	DRIV	NORM COG	Niche
Teachers have reservations		BAR	NORM	Niche

Table A. 17: Category Summary "Teachers' role".

Category Summary: "Teacher education"				
Main Messages	**Notes / Explanations**	**Driver / Barrier**	**Rule Dimension**	**Analytical Level**
No CP in teacher education	Teachers are not prepared for proper CP education Insecure in their roles Teacher education programs need to be reformed Mentions of standards for teacher education	BAR	REG COG	Regime
Reservations or lack of interest	Insecurities towards topics Topics not properly addressed	BAR	NORM COG	Niche
Teachers do not have to become "experts"		BAR	COG	Niche

Table A. 18: Category Summary "Teacher education".

Category Summary: “Outside expertise”				
Main Messages	**Notes / Explanations**	**Driver / Barrier**	**Rule Dimension**	**Analytical Level**
Outside expertise is important	Bring in new perspectives, offer counseling and materials Can foster network and cooperation More variety + support for schools (particularly, teachers) Regarding role expectations for teachers: opening up, allowing for someone else to enter the school system, offer support, and fulfill a new role	DRIV	NORM	Niche

Table A. 19: Category Summary “Outside expertise".

Category Summary: "Curriculum"				
Main Messages	**Notes / Explanations**	**Driver / Barrier**	**Rule Dimension**	**Analytical Level**
Curriculum requirements	Curriculum requirements to: develop competences, prepare for exams, pass on information Not sufficiently: enable students, help them learn to interpret	DRIV	COG REG	Regime
ESD / CP as a cross-cutting theme	Cross-cutting aspect an important part of the strategy to incorporate CP, is in the works And also binding / mandatory character of ESD guidelines	DRIV	COG REG	Niche
Need for more CP	Faulty prioritizations	BAR	COG	Regime
New orientation of curricula	New orientation is still necessary, new strategies/priorities needed In some parts has taken place, CP is starting to become more significant Move away from simple memorization at school	BAR DRIV	COG REG	Niche
Pros / Cons of (core) curricula	Curricula offer: stability, reliability, guidance, depending on subject, more freedoms, advantages in some areas of curricula (e.g., in minor subjects) but curricula: hard to adjust to new topics, extremely full (in part due to shorter school tracks), inflexible formal rules of how core curricula are developed	BAR DRIV	REG	Regime
Responsibility for curricula	Lies within the constituent state government Formal rules of who is responsible for developing core curricula	-	REG	Regime
Students' perceptions	Perception of what is taught in school, "downgrading" of topics	DRIV BAR	NORM COG	Regime Niche
Subjects that already include CP	Mostly and easily incorporated into natural sciences (mathematics, physics, biology, chemistry), technics, and geography	DRIV	REG	Regime

Support / guidance for teachers	Offering more guidance, also trainings etc. Change expectations for teachers	BAR	REG NORM	Niche
Various possibilities to incorporate CP		DRIV	- (interactions)	Niche

Table A. 20: Category Summary "Curriculum".

Cluster: School System

Category Summary: "School system and structures"				
Main Messages	**Notes / Explanations**	**Driver / Barrier**	**Rule Dimension**	**Analytical Level**
Authority and cooperation structures in school system	Complex authority structures Partly very rigid authority structures, no room for flexibility Role, expectations for schools	DRIV BAR	NORM REG	Regime
More openness and flexibility required	New conceptions of what school is / can be Structuration of schools		NORM REG	Niche
Obligation for student supervision	Can also be a burden in terms of flexibility and giving students more freedoms Ca be an asset in terms of making students participate in CPPs	BAR	REG	Regime
Perception of schools and their role in society	Need for more appreciation of schools in society Schools taking on active role in society	DRIV BAR	NORM	Niche Regime
School framework conditions are difficult	Link to rigidity of the system	BAR	REG	Regime
School system as a rigid, inflexible system	System organically grown over centuries and generations Expectations that are inherently linked to it Very rigid, not easily changed Offers reliability	BAR DRIV	NORM REG	Regime

Schools lagging behind cultural, societal developments	In terms of investments	BAR	NORM	Regime
(risk of) overburdening schools	Schools left alone, not well-equipped, overburdened Laissez-faire attitudes / indifference Role expectations that schools have to fulfill	BAR	NORM REG	Regime

Table A. 21: Category Summary "School system and structures".

Category Summary: "Coordination"				
Main Messages	**Notes / Explanations**	**Driver / Barrier**	**Rule Dimension**	**Analytical Level**
Assigned positions for environmental / climate issues and coordinators	No assigned person for coordination Left up to chance whether CP is relevant to someone at school Responsibilities of assigned climate positions are unclear	DRIV BAR	NORM REG	Niche
Coordination between teachers and outside experts	Coordination between schools and outside experts is necessary Not leave it up to chance	DRIV	NORM + interactions	Niche
Lack of access to school system	Initial contact with schools is very difficult Role of schools in society	BAR	NORM	Regime
Schools do not see themselves as public actors with outwards coordination	School = public service School not active in society	BAR DRIV	NORM	Niche Regime

Table A. 22: Category Summary "Coordination".

Category Summary: "School spaces"				
Main Messages	**Notes / Explanations**	**Driver / Barrier**	**Rule Dimension**	**Analytical Level**
Incorporate more views / competences	Give students a more important / prominent role in creating spaces Give students freedoms	DRIV	NORM	Niche
Need to create pleasant, welcoming places at school	Pay more attention to the places themselves Make effort Make them friendly and climate-friendly Value education and school Putting CP on the agenda	BAR DRIV	NORM COG	Niche Regime

Table A. 23: Category Summary "School spaces".

Cluster: Political financial aspects

Category Summary: "Public budget / financials"				
Main Messages	**Notes / Explanations**	**Driver / Barrier**	**Rule Dimension**	**Analytical Level**
General problems with financing	Quickly about large sums of money General statements Responsibilities spread among different government levels School investments, no support from higher federal levels	BAR	REG	Regime
Lack of financing strategy / priorities	Just allocation resource is a challenge lack of strategies for CPPs and their continuance lack of priorities for investments into schools CP not viewed as a priority lack of debate about financing established funding practices/rules ideas about the effectiveness of instruments lack of courage	BAR	COG NORM	Regime
No money is made available / not available for schools		BAR	COG	Regime
Positive financial outlooks	Some positive developments and financial support	DRIV	COG	Niche Regime
Too small investments in schools	Education sector tends to be overlooked in financing	BAR	COG	Regime

Table A. 24: Category Summary "Public budget / financials".

Category Summary: “Funding practices” + “Funding programs”				
Main Messages	**Notes / Explanations**	**Driver / Barrier**	**Rule Dimension**	**Analytical Level**
Need for better and more long-term funding strategies	Problematic funding practices in Germany No procedure of how to establish CPPs long-term	BAR	REG COG	Niche Regime
New and more funding programs becoming available		DRIV	REG	Niche
BMBF funding		DRIV	REG	Niche
Important NCI funding	Main program referenced for funding municipal climate projects	DRIV	REG	Niche

Table A. 25: Category Summary “Funding practices” + “Funding programs”.

Category Summary: “Systemic shortcomings” + “Teacher / personnel shortages”				
Main Messages	**Notes / Explanations**	**Driver / Barrier**	**Rule Dimension**	**Analytical Level**
No or too little investments in school infrastructure	lack of investments in infrastructure (link building politics), also digitalization underestimating importance of CP and schools past priorities alluding to how to value schools, being ashamed of current status	BAR	COG NORM	Regime
Shortage of teachers (and administrative personnel)	especially lack of teachers schools cannot flourish/develop CP is viewed as an "on top" topic sometimes not sufficient municipal personnel to conduct energy assessments, etc. (CPPs) official procedures in schools for employing sufficient teachers etc. a lot is expected from teachers (role expectation), even with proper/better funding, still overburdened	BAR	REG COG NORM	Regime

Table A. 26: Category Summary “Systemic shortcomings” + “Teacher / personnel shortages”.

Cluster: Political strategic aspects

Category Summary: "Political agenda and willingness"				
Main Messages	**Notes / Explanations**	**Driver / Barrier**	**Rule Dimension**	**Analytical Level**
Increasing public pressure	Especially, school authorities under pressure to act Normative pressure + school authority's tasks (REG)		NORM REG	Regime
Lack of long-term thinking	Lack of strategy	BAR	COG	Regime
Need for political willingness to take measures	Need for willingness to act and create more political support necessary consensus is not stable, always debate about it	DRIV BAR	COG	Regime
New priorities for CP (necessary)	In general, priorities have shifted towards more CP But still difficult, not always translated into appropriate action What actors are expecting from politics and their roles	DRIV BAR	COG NORM	Niche Regime
Politicians evade responsibilities	Vagueness of politicians, how politicians debate / frame Attitude of "this always worked in the past, why change it" Now, politicians have realized there are regulatory requirements for CP Disappointment of how politicians fulfill their role	BAR	REG COG NORM	Regime

Table A. 27: Category Summary "Political agenda and willingness".

Category Summary: "CP as a strategy"				
Main Messages	**Notes / Explanations**	**Driver / Barrier**	**Rule Dimension**	**Analytical Level**
Appropriate CP strategies	Schools need to have right concepts / strategies / guidelines in place	DRIV	COG	Niche
Need for long-term strategies	Think more long-term Things need time	DRIV BAR	COG	Niche
Need to standardize / institutionalize activities		BAR	COG	Niche
Ubiquity of CP topics		DRIV	COG	Regime

Table A. 28: Category Summary "CP as a strategy".

Category Summary: "Political processes"				
Main Messages	**Notes / Explanations**	**Driver / Barrier**	**Rule Dimension**	**Analytical Level**
Complex decision-making	Including dilemma situations / predicaments in decision-making Need to bring across complexity to students, accepting and dealing with complexity, accepting small steps at a time Role perceptions in decision-making	DRIV BAR	COG REG NORM	Regime
Political discourse	Hard to find consensus or approval	BAR	COG	Regime
Political framework conditions	Especially, requirements for calls for tender / public spending	BAR	REG	Regime

Table A. 29: Category Summary "Political processes".

Cluster: Overall discourse

Category Summary: "Awareness"				
Main Messages	**Notes / Explanations**	**Driver / Barrier**	**Rule Dimension**	**Analytical Level**
Accepting and recognizing that each individual can take small steps	Being accepting of measures taken Understanding that everyone can take small steps, it does not have to be so much	DRIV	COG	Niche Regime
Awareness in society / societal pressure	Most of society knows about climate change Puts pressure on responsible persons	DRIV BAR	NORM COG	Regime
CPPs for comprehending CP and urgency	Potential impacts of CPPs	DRIV	COG	Niche
CPPs to change ways of thinking, raise awareness	Potential impacts of CPPs Also to change behavior	DRIV BAR	COG NORM	Niche
Differing levels of awareness among youth	Not all of the youth has the same level of awareness for CP Not all of youth is pro-CP, those people have other things on their minds Some have different agenda (re: socio-economic backgrounds)	BAR DRIV	COG	Regime Niche
Increasing awareness and concern for CP		DRIV	COG	Niche Regime
Teacher can pass it on when they have grasped the importance of CP	Highlighting the importance of teachers' role	DRIV	COG	Niche
Topic needs more attention		BAR	COG	Niche
Topic visibility			COG	Niche Regime

Table A. 30: Category Summary "Awareness".

Category Summary: "Public discourse"				
Main Messages	**Notes / Explanations**	**Driver / Barrier**	**Rule Dimension**	**Analytical Level**
Lack of honesty and openness in discourse	Need to be more open and honest in debating CP issues Unpopular topic	BAR	COG	Regime
Lack of realism / pragmatism in debate	Call things out as they are Not encourage false hope	BAR	COG	Regime
Negative prejudices towards CP	Unpopular topic Overly stereotypical opinions, prejudices NIMBY	BAR	COG	Niche Regime
Politicians with reservations towards CP and youth	Politicians annoyed by CP / youth Do not want to hear about it Do not take youth seriously	BAR	COG	Regime
Prohibitions / restrictions are perceived negatively		BAR	COG NORM	Regime
Youth has high demands	Youth is very ambitious Calls out on politicians to act Can be challenging, but is necessary	DRIV	COG	Niche

Table A. 31: Category Summary "Public discourse".

Overview: Landscape factors

Summary: "Landscape factors"		
Main Messages	**Notes / Explanations**	**Driver / Barrier**
COVID-19-pandemic	Negative effect Slowed things down Reduced possible interactions Led more problems to the surface Overwhelmed schools and administrations Shifted focus away from CP, shifted priorities overall	BAR
FFF	Generally positive effect, sometimes ambiguous Raised awareness and called attention to CP Amplified topic and the discourse Motivated some, but not all, many of CPP participants already involved before Reduced some barriers for CP	DRIV
Generational aspects	Need for younger people in school positions (new school principals coming into school system) Older people rather rigid in their way of thinking Young people have different approach to things, different way of communicating Younger generations burdened by the past	DRIV BAR
Media / social media	Positive effect Internet helped to spread ideas and CP Made CP popular Social media and FFF Amplified topic and the discourse	DRIV
Financial factors	Current low interest rates Socio-economic structures and inequities in Wuppertal challenging budgetary conditions in Wuppertal	BAR
Inclusion and integration of international students and refugees	Additional responsibility and challenge for schools	BAR
German federal election	Negative effect Heated debate CP as decisive issue Uncertainty	BAR
Global politics	Global populism Donald Trump + "Fake News" UNESCO Global Citizen Education	BAR DRIV
Extreme weather events and ecological effects of climate change		BAR

Table A. 32: Summary "Landscape factors".