**How are participatory Education for Sustainability (ESD) projects influencing sustainability competences of high school students?**

* Need for sustainability competence
  + Ongoing/ worsening problems
  + Behaviour- knowledge gap
  + Importance outcome orientation
* Effectiveness of Sustainability competence depends on the type of educational intervention
  + Very mixed results (knowledge up, behavior/ attitude did not increase)
  + 🡪 empirically looking at projects which apply those effective methods
  + ESD now in schools and local education plans, with mixed effects
  + 🡪 looking at schools were specific ESD program was carried out
* Sustainability competences depend on the scale and metric of observation// outcome orientation requires clarity about the goals which are targeted
  + goal orientation through local education plans 🡪 in case of outcome measurement, precise goal (content) specifications and operationalisations are necessary
  + good outcome measurement needs validity criteria (self-efficacy as validity?)
  + trade-off regional specificity and aim of getting broad picture of state of play and development
  + 🡪 importance of outcome orientation
  + 🡪 Long vs short-term
* Sustainability competence and its attribution to education intervention can be assessed through different methods, each with its own advantages and disadvantages (need for operationalisation?)
  + 🡪 importance of empirical data that uses three dimensions and can be related to project?
  + attributing effectiveness of intervention can be assessed by looking at involvement of students (can level of involvement already validate the indicators?)
  + 🡪 effectiveness of intervention is dependent on impact and should therefore still be monitored throughout and after project
  + 🡪 established survey
* Sustainability competence interplays with real environment and feeling of self-efficacy
  + Question is whether behavior can and should be a goal of ESD interventions?
  + 🡪 focus on self-efficacy as better outcome indicator?
  + 🡪 effectiveness of intervention is dependent on impact and should therefore still be monitored throughout and after project
  + 🡪 need for long-term impact focus?
* Output orientation calls for long-term assessment and other additional methods to evaluate impact
  + 🡪 possibility for both short and long term impact by assessing at different project stages?
* Sustainability competence can be validated by including other measures.
  + 🡪

# Introduction

Globally, we as humankind are facing many ecological and social crises at the same time. To address these challenges, there is strong scientific agreement for the necessity of collective pursuit of ecological and social aims. Many people obtain from acting together against climate change or social inequalities because they do not feel they or their group can make any difference. Understanding how people come to feel human agency and the belief that they can achieve something, in terms of individual and collective self-efficacy, plays a crucial role in motivating people to act. Motivating young people is especially important. It is not only their future that is expecting many uncertainties and changes, their interests should already now be taken serious and be included. By taking their ideas and aims serious and giving them spaces of opportunity to shape their surroundings, we can foster empowerment and motivation to act together as young people. One very present environment for young people is the school. Participative Sustainable Development Education (SDE) projects are a promising opportunity for both: creating this space of opportunity to influence their surroundings, while at the same time learning and experiencing to act together. When designing ESD projects it is important to understand the complexity modes of action in order to be able to implement good educational interventions. We currently only have a limited understanding of how participative Education interventions such as ESD-projects, as potential enablers , are contributing to self-efficacy beliefs in students.

Within reports and recommendations on SDE, it is common convention, that certain methods and approaches are appropriate to reach the goals set out. These methods include participative learning, self-induced learning, project work, voluntarism with the aims of achieving critical thinking, system thinking, and so on. Innovative, service-learning, portfolio-work, project work, roll- and plangames, problem-based learning (REF RIEß et al, 2021/ Rieß et al 2022 VORLESUNG1). However, until now, empirical data on the impact and outcome of ESD interventions within educational settings exists very little. Some of the challenges of assessing the impact of ESD interventions include the operationalisation and measurements. Lessons learnt so far are the agreement on the broad tripartite classification of ESD goals in terms of achieving competencies in the knowledge, attitudes, and behavioral dimensions (Waltner, application-oriented). (SW AS COVERING ALL OF THEM?). 🡪 precise goal (content) specifications and operationalization are needed in order to capture the underlying construct.

Do we need not only a shift from the input to the outcome orientation in the analytical/evaluative perspective but also a shift of attention from the purely cognitive to the behavioral components of SCs?  
When aiming for global indicators which are easily replicable and comparable, detailed observations need to be sacrificed. Consequently, additional qualitative studies looking into further details of the SC development process would represent a useful complement.  
So far, empirical research in that area, has focussed mainly on Climate attitude and behavior. However, these components ignore the aspect of creating spaces of opportunity to influence their environment (as participatory and experiential learning) which could be seen as combining cognitive, behavioral, and emotive components in its measures. Empirical research on whole school approach? Relevance of empirical data, analysing SDE interventions, which consider operationalisation and include in its measurement beyond cognitive measurement and gain of knowledge.

Considering increased self-efficacy through participatory and experiential as an aim of SDE interventions brings up the question of operationalising measurement of self-efficacy as well as its relation to pedagogical approaches and which other factors might influence it. Recent theoretical developments have emphasised the importance of differentiating and including agents, actions and aims and different connections when analysing self-efficacy related within ecological and social context. Furthermore, the desirability of the aim and aim content might play a central role, when analysing self-efficacy. So far, research has focussed more on individuals and has not yet considered the influence the environment (Whole School Approach) can play.

# Objectives and research questions

My aim is to quantify how ESD interventions influence students’ sustainability competences over time. Existing empirical data of climate attitudes and climate behaviour and the opportunity for continuous data collection allow for long term assessments of sustainability competences over time. Recent theoretical developments on self-efficacy beliefs provide a new possibility to enrich the measurements with these aspects. By integrating previous quantitative research from two schools with current, and theoretically comprehensive data collection, my analysis provides insights into the effectiveness of ESD projects in enabling human agency of high school students.

* Do students with higher level of involvement in the ESD project experience more changes in climate attitude and behaviour over time than students with lower levels of involvement?
  + How does the project evolution influence the magnitude of the changes in climate attitude and behaviour?
* Do students with higher level of involvement in the ESD project experience higher (collective and individual) self-efficacy beliefs than students with lower levels of involvement?
  + How do desirability of the aim and group identification influence the magnitude of the self-efficacy beliefs?
* How are changes in climate attitude and behaviour influenced by (collective and individual) self-efficacy beliefs?

OR

* Do students experience changes in climate attitude and behaviour over time?// How do sustainability competences (climate attitude and behaviour) among students change over time (through different phases of an ESD intervention)?
* How is climate attitude and behaviour influenced by self-efficacy beliefs?
* How do climate attitude and behaviour and self-efficacy beliefs respond to levels of involvement of the students?

# Research hypotheses/ predictions?

# Methods

*In my analysis I ask how the level of participation of a participative SDE-intervention influences the individual and collective self-efficacy beliefs. I assess variation in agent-action-aim and agent-aim self-efficacy beliefs at different project stages across schools. To quantitatively test the impact of SDE-interventions, I will gain data by self-reported surveys.*

## A blue and green logo Description automatically generatedProject description “KlimaRatSchule”

### Aims

“ The KlimaRatSchule (KRS) project aims to promote and establish an active climate protection culture in schools. To achieve this, KRS combines effective climate protection measures with democracy education. This means that pupils are actively involved in the development of a climate protection concept through a democratic participation process. This sensitizes the students to this topic and develops skills that enable them to act and make decisions in the interests of climate protection beyond the school day. In addition, this process allows thematic priorities and measures to be identified, on the basis of which a climate protection concept is created that is individually adapted to the school.” (KRS Projektbeschreibung, 2024).

### Project stages and resulting students’ level of involvement

*The project can be divided into three phases from the students points of view. In the first phase, a voluntary student team is formed, the so called KRS-expert group. This group receives an introduction about the aims and phases of the project. Additionally, they get informed about general facts about climate change and four relevant areas within their school: energy, mobility, nutrition and procurement. In the first phase, the KRS school group has the task of drawing up a carbon footprint for the school. On the other hand, this group prepares the second phase, which will be explained in more detail later.*

*The second phase includes a micro-citizen report, which was adapted to the school context and is therefore called "Micro-citizen report for schools" (MBGS) (KlimaRatSchule, 2022, p. 1). This is a democratic process in which randomly selected pupils discuss relevant issues and problems and develop solutions.*

*First, 50 pupils are randomly selected and divided into two equal groups on the day of the MBGS. Each of these two groups deals with two areas of activity in parallel in two rounds, so that the four areas of activity mobility, nutrition, procurement and energy are dealt with in total. In each round, the two groups of 25 are divided into five small groups. In these small groups, also known as planning cells, the participants discuss options and finally put three proposals for measures on paper. At the end of each round, the proposals from all planning cells are presented, prioritized and ranked in a plenary session of 25 participants. The process is illustrated graphically in Figure 14.*

*Before each new discussion round, the KRS school group presents its findings on the respective area to the group of 25. The composition of the discussion cells is drawn by lot anew in each round within the group of 25. In the plenary of the groups of 25, the proposals of all small groups are presented and prioritized according to a carefully considered procedure. The entire Climate Council is prepared and carried out by the KRS school group.*

*The participation of pupils from the KRS school group in the MBGS is not excluded. At one of the two schools, not only pupils were involved, but also a total of ten people from the teaching staff and other school personnel, so that a total of only 40 pupils took part in the MBGS.*

*The third phase includes the creation of a roadmap with concrete goals and steps for more climate protection at the school (KlimaRatSchule, 2022, p. 2). After the MBGS, this development is again the responsibility of the KRS school group, which brings together its findings on the climate balance, results from the MBGS and general considerations on implementation options. The completion of this roadmap marks the end of the KRS project, but above all gives the go-ahead for the school to implement the measures set out in it.*

A diagram of a diagram

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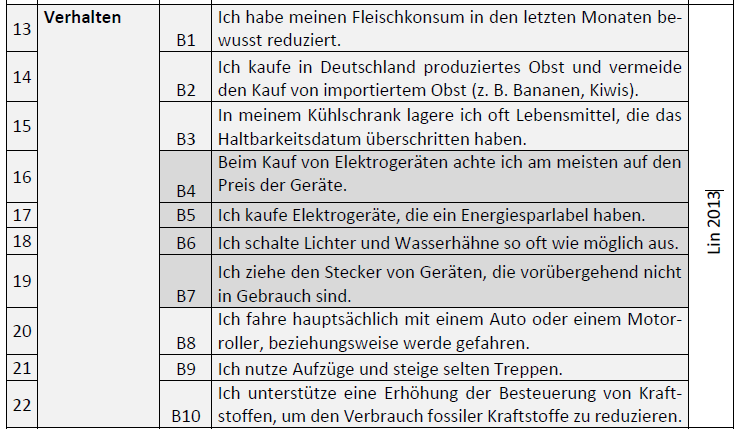
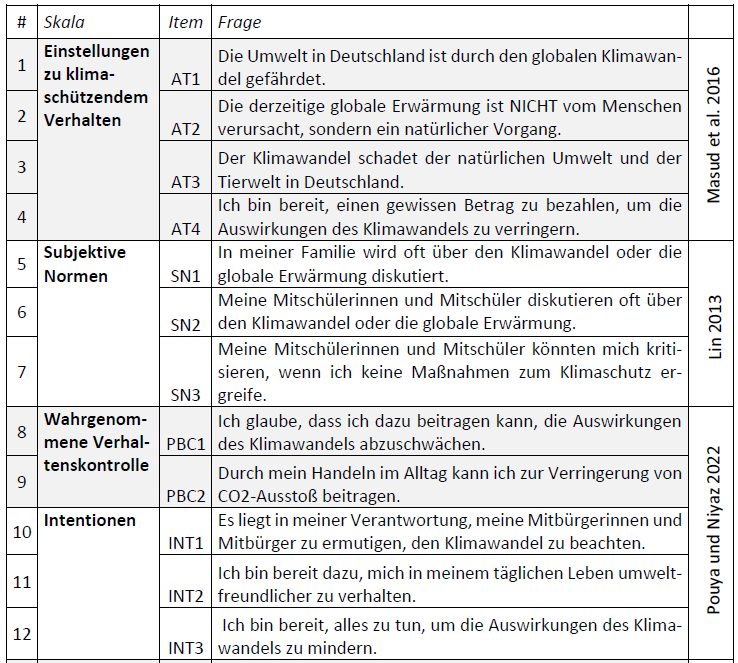
### Data collection at schools and their description

The impact evaluation is being carried out at two of the participating schools in the Freiburg area, which are supervised by the registered association Solare Zukunft. The pupils of the two schools started the project in January 2023 and will continue to work on it in the coming years. The main part of the project will take place between January and the end of the school year in July 2023.

### Surveys

#### Climate attitude and behaviour

From previous master thesis and conducted at two schools with two points of measurement:



#### Self-efficacy beliefs

**Selbstwirksamkeit nach Triple A Framework (Hamann et al., 2023)**

Nun kommen ein paar Fragen zu deiner persönlichen Meinung. Hier gibt es keine richtigen oder falschen Antworten. Gib bitte ehrlich und spontan an, was du darüber denkst.

1. Ich glaube, dass meine eigenen Handlungen einen Beitrag zum Klimaschutz leisten können. (Agent-aim)
2. Ich glaube, dass ich den Klimaschutz vorantreiben kann, indem ich in meinem Umfeld über den Klimawandel aufkläre. (Agent-action-aim)
3. Ich glaube nicht, dass ich in der Lage bin, mich für den Klimaschutz einzusetzen. (Agent-action) *INVERS*
4. Ich glaube, dass ich dazu in der Lage bin, andere davon zu überzeugen, sich für mehr Klimaschutz einzusetzen. (Agent-action-aim)
5. Ich glaube nicht, dass ich Möglichkeiten habe, einen Einfluss auf den Klimawandel zu nehmen. (Agent-aim) *INVERS*
6. Ich glaube, dass ich beeinflussen kann, wie entscheidungstragende Personen oder Organisationen bezogen auf den Klimaschutz handeln. (Agent-action)
7. Ich glaube, dass ich entscheidungstragende Personen oder Organisationen dabei unterstützen kann, sich für Klimaschutz einzusetzen. (Agent-action-aim)
8. Ich glaube, dass ich mich in Zusammenarbeit mit anderen sinnvoll für den Klimaschutz engagieren kann. (Agent-aim)

Beantwortung auf 7-stufiger Skala:

1 = Stimme gar nicht zu, 4 = Teils/teils, 7 = Stimme voll und ganz zu

## Statistical analysis

All statistical analysis will be conducted in R version 4.0.2.

I will model climate behaviour/ attitude/ self-efficacy beliefs as the response variable. Level of involvement, XXX .The random term in my model will be XXX.

I will apply the same model approach for climate attitude/ self-efficacy beliefs accordingly.

# References

# Proposed timetable