Universität Augsburg University

Institute of **GEOGRAPHY**

Climate Change Education Promoting Action through Inquiry-based Learning

A Systematic Literature Review

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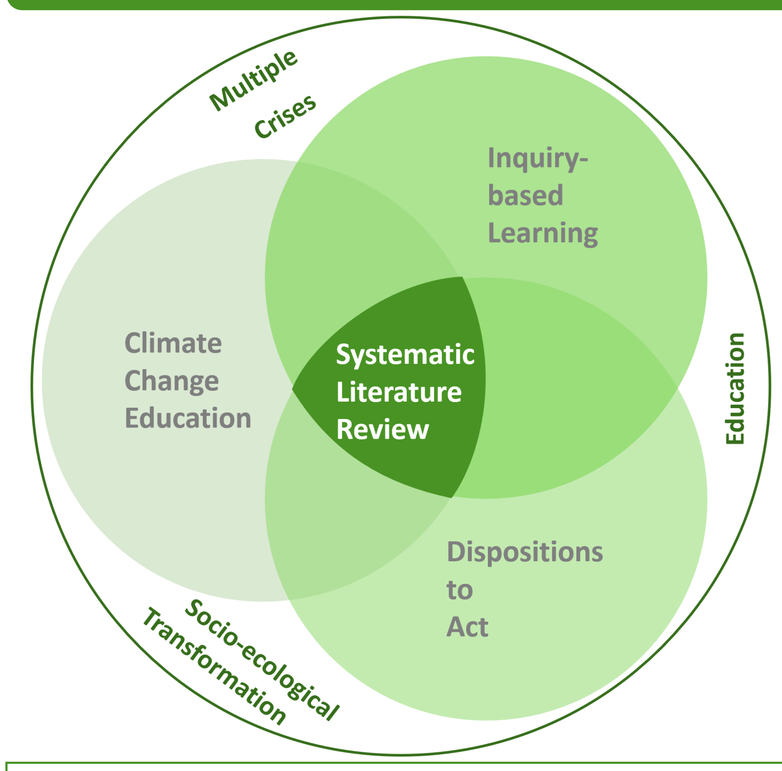
Theoretical Background



Multiple socio-ecological crises require a democratically initiated **transformation** to a society in which the **ecological foundations** of human life are protected and **fair social welfare** is guaranteed (Brand & Wissen 2017, Raworth 2020, Seitz 2015). **Education** is a critical contributor to this transformation by tackling these crises already in schools (UN 2015, WGBU 2011).

Climate Change Education sets the focus on the crisis of climate change and represents education in the context of a **volatile, uncertain, complex and ambiguous** world, that is characterized by uncertain and context-specific knowledge (Stein 2021, Stevenson 2017: 1). Students should acquire **climate literacy** that enables them to attain necessary knowledge, process relevant information and communicate it (Azevedo & Marques 2017). They should learn to think **critically** and **creatively** towards climate change mitigation and adaptation and develop capacities to act (Stevenson 2017).

Dispositions to act should among other factors therefore be fostered in a climate change learning environment, especially when looking at the **mind-behaviour gap** (Siegel et al. 2018). To mitigate this gap, a **holistic** understanding of what is necessary to act is needed, that exceeds the transfer of knowledge and thus includes individual and societal norms as well as calculations of costs and benefits, habits and emotions (Hamann 2016). Also, a focus should be set on **systemic** and **social responsibilities**, to enable a proper epistemic fit (Lamb et al. 2020, Fritsche et al. 2018).

Inquiry-based Learning refers to active educational work-forms, which serve the **search for, finding and presenting** of knowledge that is new (at least) to the learner, and which happens analogous to the characteristics of **scientific knowledge production** regarding attitude, methods and systematic proceeding (Brumann et al. 2022: 3, Khalaf & Zin 2018: 550, Messner 2009: 23). In the context of Climate Change Education, it represents a promising approach, as it holds for example the potential to reduce the **psychological distance** to the topic of Climate Change or promote "**twenty-first century skills**" (Chiari et al. 2016, Kusima 2018).

There is a research desideratum regarding the interrelation of Climate Change Education and Inquiry-based Learning with a specific focus on dispositions to act, which the following study aims to fill (e.g. Anderson 2012, Kranz et al. 2022).

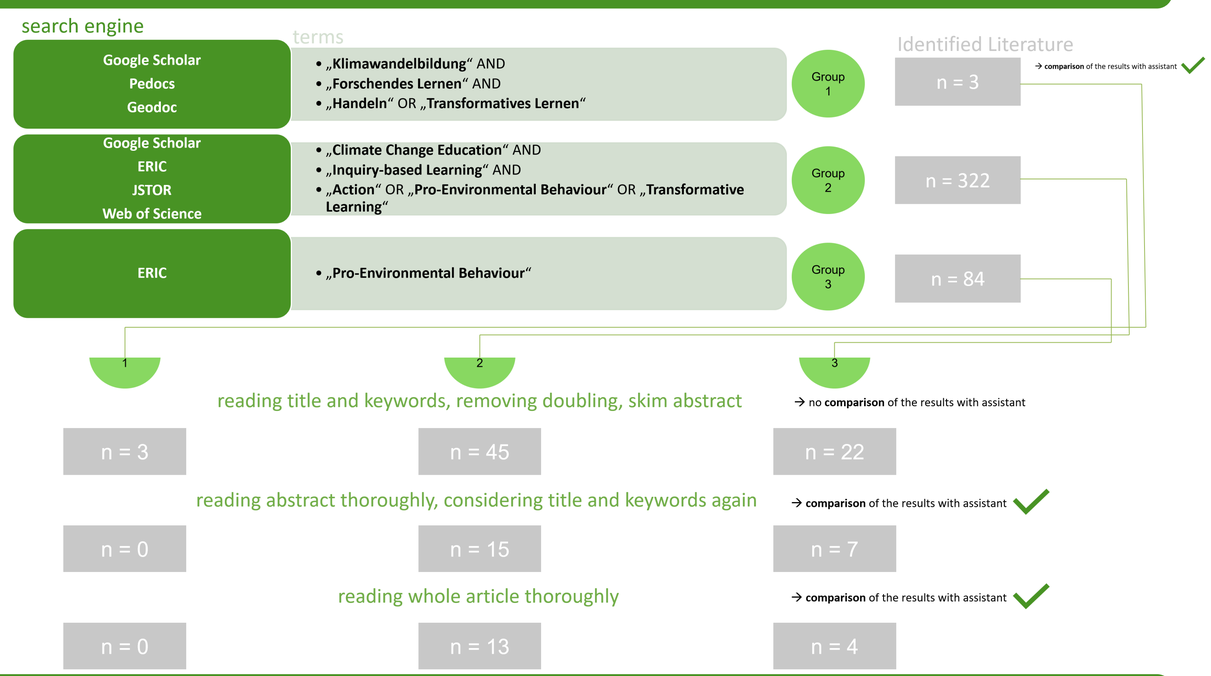
Research Question

Which goals, challenges and approaches of Climate Change Education (CCE) and Inquiry-based Learning (IBL) can be identified that are related to dispositions to act (DTA)?

Methods

- According to **Xiao & Watson (2019)** and **PRISMA-Guidelines**
- Search carried out on the **03rd August 2022**
- 11 empirical studies, 3 systematic literature reviews, 3 theoretical studies
- **Qualitative content analysis** according to **Kuckartz (2022)**
- **Deductive coding system** expanded with **inductive codes** → **comparison** of the results with assistant ✓
- **Consensual coding** with a trained assistant (699 Codes) → **comparison** of the results with assistant ✓

Search Strategy & Study Selection



Results

Goals, Challenges and Approaches of CCE and IBL Related to DTA

Goals

- Enable **transformative engagement** on an individual and systematic level
- Development of climate, political, transformative and scientific **literacy**
- Foster imagination of **alternative futures** and help students to realise them
- Enable **active learning** with relations to the real world
- Improve **system** knowledge, **action** knowledge and **effectiveness** knowledge
- Foster competences to deal and cope with a rapidly **changing world** and **uncertain future**
- Foster **solution** oriented, **integrative**, **reflexive**, **creative** and **critical** thinking

Sources: Kubisch 2021, 2022, Leite 2022, Kranz 2022, Kolenatý et al. 2022, Trott 2022 , Wi & Chang 2019, Deisenrieder 2020, Jones & Davidson 2021, Bofferding & Kloser 2015, Muroi & Bertone 2019

Challenges

- Many approaches are very **time consuming**
- Missing connection to lifeworld and **daily reality** of students
- Underrepresentation of **holistic viewpoints**
- Students feeling **overwhelmed**, **anxious** and left **alone**
- Lack of **political** dimension and sole focus on **private sphere** action
- Students often acquire knowledge transcending climate science from **peers** and **social media**
- **Teachers** have to be adequatly educated

Sources: Kubisch 2021, 2022, Leite 2022, Kranz 2022, Kolenatý et al. 2022, Trott 2022 , Wi & Chang 2019, Deisenrieder 2020, Jones & Davidson 2021, Tasquier & Pongiglione 2019

Approaches

- **Learning by doing** approaches within the lifeworld of the students
- **Transdisciplinary** education
- Foster **interdependent** and **participative learning**
- Learning **beyond the classroom**, especially in community settings
- **Longer** project like formats with **selfdetermination** and **-reliance**
- Explicitly address **local** mitigation and adaptation measures as well as multifaceted **cause** and **effect** relations
- Methods focussing on **changes in perspective**, **role play**, cross-curricular **discussions**, **out of the box** thinking

Sources: Kubisch 2021, 2022, Leite 2022, Kranz 2022, Kolenatý et al. 2022, Trott 2022 , Wi & Chang 2019, Deisenrieder 2020, Jones & Davidson 2021, Tasquier & Pongiglione 2019, Riede 2017, Tang & Hadibarta 2022

Discussion

- The results can be used to **design** and **evaluate conceptions** that are concerned with CCE through IBL with a focus on climate action.
- The results are on different **levels** of **abstraction**, because of the different kinds of papers included in this study.
- There are not many studies that **incorporate** CCE, IBL and DTA **equally** – there is still research necessary.
- Although **Transformative Learning** encompasses different theoretical and instructional approaches, it is a promising approach to promote IBL, CCE and DTA alike – further studies are needed to bring about a conceptual sharpening of Transformative Learning in the context of schools.

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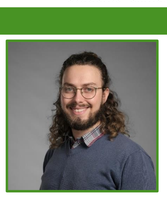

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