

THE STUDENT LABORATORY LABS4FUTURE: HOW CLIMATE CHANGE KNOWLEDGE CAN BE LINKED TO EFFECTIVE ACTION

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Abstract. The talk presents the central elements of and thoughts behind the two-day student laboratory Labs4Future. This extracurricular offer for 15-year-old high school students tries to manage the linking of knowledge about climate change with effective individual and societal action. Based on a newly developed theoretical framework *Lessons4Future*, which integrates environmental psychology, sociology and science education, the talk showcases how we try to transfer the theory into experiments and activities.

Among the presented elements are the *Carbon Credits*, an area visualization of daily personal and societal emissions, and a Mystery that addresses responsibility for the problem and solutions of climate change.

Introduction

Today's 16-year-olds will grow up to live in world 2.5°C warmer than industrial levels. This will set off an unprecedented upheaval in food and water supplies, weather patterns and general living conditions. Luckily, from today's perspective, we likely can still determine how far the changes reach.

We work under the premise, that science education can contribute significantly to closing the gap between knowledge about the threatening consequences of climate change and societal and individual action.

Lessons4Future – The underlying theoretical Framework and its evaluation

We develop a theoretical framework that tries to integrate and adapt existing findings and models to educational settings. Three main influences make up the framework:

Firstly, research from physics and science education: Preconceptions about climate change (1), knowledge types (2) and research on students' knowledge (3) and affective predispositions(4,5). Secondly, environmental psychological models of linking knowledge and action (6–8) and thirdly, sociology and communication psychology on how to communicate danger and time delayed consequences (9,10).

We evaluate this *Lessons4Future* framework in a design-based research project using a mixed methods design. In a Pre-Post-Follow Up setting the students answer questionnaires on knowledge (3), environmental attitude (11) and climate change hope (closely resembling perceived behavioural control) (12). Selected by Pre-Post data results, we plan to additionally invite students to perform a round of interviews, to try to pinpoint new and/or confirm theoretical hypothesized educational settings or mechanisms that evoke action.

What we hope to show qualitatively is that Labs4Future, while applying the frameworks concepts, manages to improve knowledge, environmental attitude, and perceived behavioural control. Being a learning setting that has many similarities to school lessons, the framework and the developed experiments and activities may prove useful to teachers who plan their lessons.

The talk: How to link knowledge and action in practise

The talk's central aim is to present how the theoretical concepts of the framework's theory are realized in activities and experiments.



Figure 1: Some impressions from Labs4Future: Transmission of infrared radiation through greenhouse gases, photosynthesis of leaves, trees as a carbon sink and students selecting Carbon Credits

For this to succeed the talk follows the two Labs4Future days, giving a general overview and focussing noteworthy elements. While all stations are shown briefly to get an overview, three are shown in detail:

Carbon Credits, an area visualization of daily personal and societal emissions. This method considers effectiveness knowledge and perceived behavioural control. A *Mystery* about the complicated attribution of guilt for climate change related deaths, which addresses the constructs personal and moral norms and system thinking.

The behavioural inhibitive climate anxiety is being countered in a *utopia-thinking* method, that also tries to break up the unquestioned habits of society and conceptualize other ways of living a happy and sustainable live.

We plan to present some preliminary results from this second iteration of research, combined with some data from the large pilot (N=300). Lacking statistical will focus on the results from interviews on how students perceive this kind of educational setting in hindsight.

All in all, the talk showcases a way on how to teach about climate change in a setting, that takes climate positive action into focus. Different materials and approaches are presented on site.

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