RESEARCH-BASED ITERATIVE SCIENCE CURRICULUM DEVELOPMENT

LFE

Nana Quistgaard, Niels Matti Søndergaard & Mikkel Bergqvist, The LIFE Foundation





SO WHAT IS LIFE?

- LIFE is a foundation: The LIFE
 Foundation
- LIFE is a Danish educational initiative that provides teaching materials for primary and secondary school science
- The LIFE teaching units are situated within socio-scientific issues using guided inquiry
- The 10-year initiative is externally funded

LIFE















MOBILE LAB

LAB UNITS: One-day visits

LIFE CAMPUS LAB

LIFE













LIFE'S MISSION

To strengthen children's and adolescents':

- science and technology <u>Bildung</u>
- interest in science and technology
- <u>aspirations</u> to engage with and choose an education within science and technology

regardless of student background

Pawson & Tilley, 1997

THEORY OF CHANGE



EXTENSIVE EVALUATION PRACTICE & ITERATIVE APPROACH



IMPACT EVALUATION OF SHORT-TERM GOALS

Quantitative part

- Rasch-validated survey measuring unitspecific situational interest and intrinsic motivation for school science in general
- Rasch-validated survey measuring selfefficacy of:
 - Specific content capacity beliefs
 - General inquiry capacity beliefs
- Pre & post with control group (dif-in-dif)
- Treatment group of approx. 2000 students
- Control group of approx. 1000 students
- Post teacher-survey assessing:
 - Preparation and Implementation
 - Perceived student achievement
- Register data

Qualitative part

- Twofold purpose:
 - 1. Plausible explanations to possible student effects
 - 2. Input for discussion of improvement potentials
- Research questions
 - How do the teachers use the teaching material in relation to the intentions?
 - How do the students engage in the different parts of the unit?
 - How do the teachers bring the SSI into play during the unit and what does that mean for the students' engagement?
 - How do the teachers bring the inquiry approach into play during the unit and what does that mean for the students' engagement?

QUALITATIVE INVESTIGATION OF KIT UNIT

Data collection and analysis

- 8 case-classes
- Observation
- Interviews

IIFF

Comparative case-study analysis



Desk study

- SSI quality
- Interest potential
- IBSE quality
 - Structured (little autonomy, step-be-step instruction)
 - o Guided (substantial autonomy, independent planning)
- Results
 - $\,\circ\,$ 6 out of 7 experiments are structured, only one is guided
- Preliminary conclusions
 - Many teachers and students are challenged by a high degree of autonomy
 - Decreased autonomy in the next iteration
 - $\circ\,$ We make materials for others to use
 - $\circ\,$ We need to provide support for the teachers
 - > We can't design the perfect teacher support



RESEARCH AT LIFE

- Provide a platform for researchers
 - Research questions either fundamental or linked to LIFE's teaching units
- Purpose:
 - Support high-quality research
 - Improve science teaching practice
- Three research projects, e.g.
 - Collaborative Courageous Science DSE, Uni. of Copenhagen PI: Prof. Morten Misfeldt

CONTACT INFORMATION

Nana Quistgaard, Ph.D. The LIFE Foundation Email: <u>naq@life.dk</u> <u>https://life.dk/english</u>

