

IMPLEMENTING STEAM EDUCATION THROUGH TEACHER TRAINING (Longitudinal research)

Investing in the concept of Integrated STEAM and SEL (SIS) education may encourage tolerance, foster the development of self-efficacy and social values, and nurture collaboration to leverage and link all relevant resources towards a STEAM learning model.

The goal

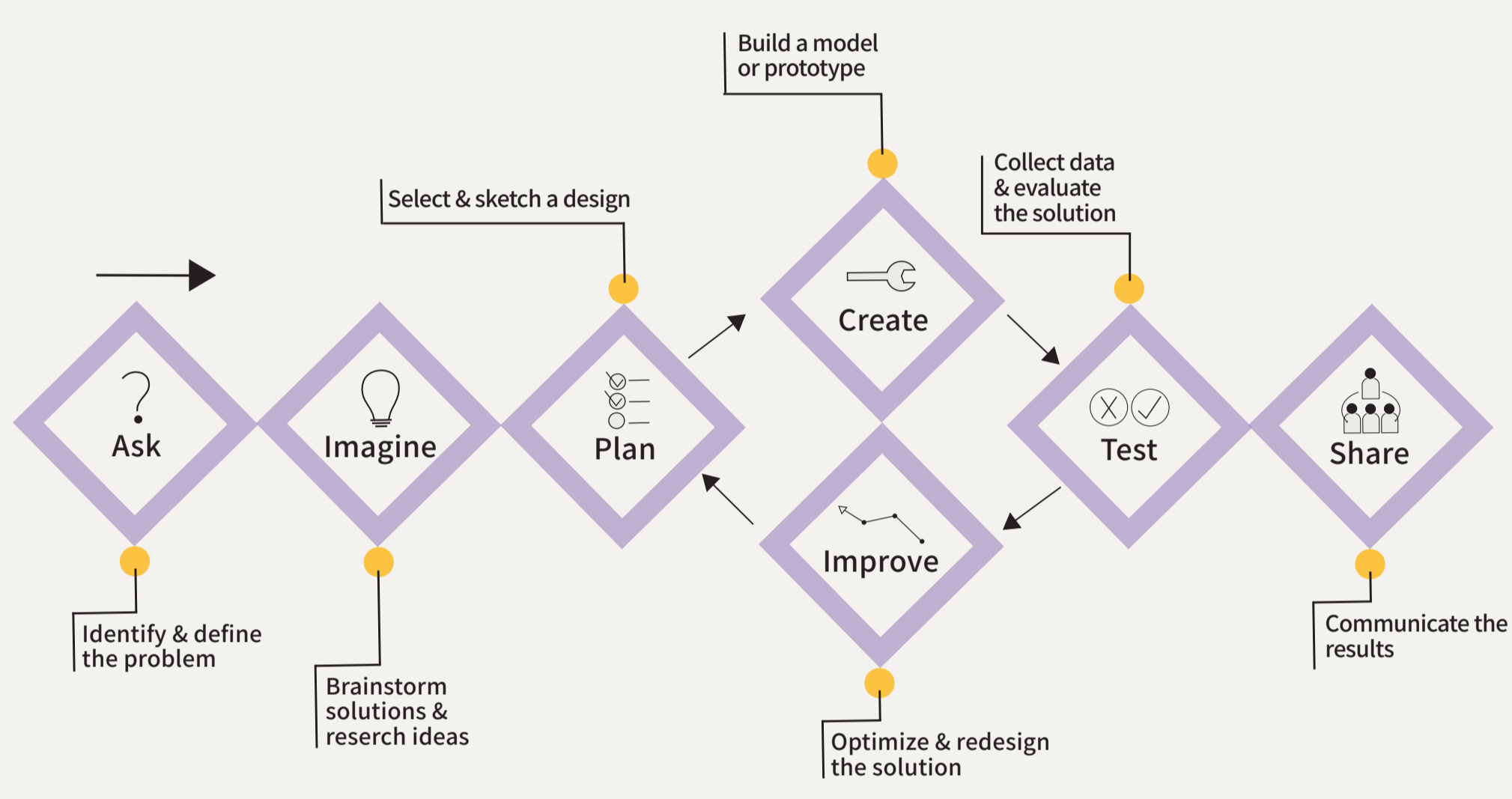
To create a common discourse and promote research to gain insights into the professional development of STEAM education.

Stage A

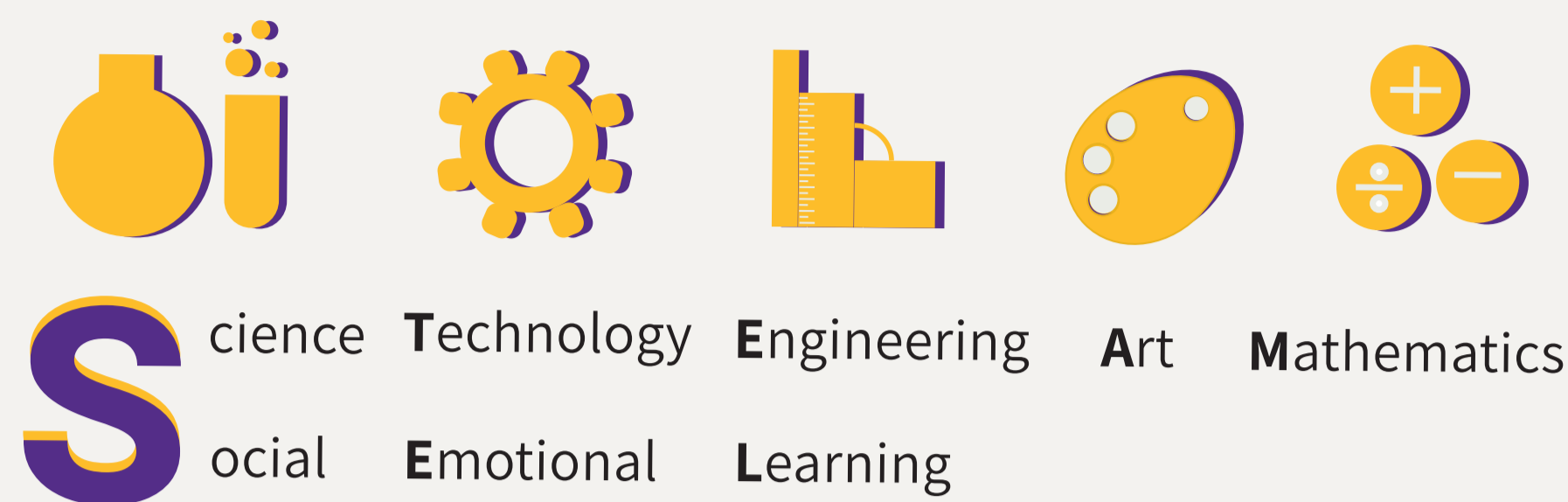
Introduction to SIS education to teachers in all the fields (30 hours)

Some of the topics studied

- Principles of STEAM teaching for all
- The constructionist approach and its application
- Integrating 21st century skills and graduate 2030s and into STEAM activities
- STEAM activities in Israel and around the world
- Experience in a soap membrane lab
- Experience in **Engineering Design** processes plus presenting and discussing them.



SEL Integrated with STEAM (SIS)



Stage B

Experience in an interdisciplinary project (ex. sunflower growing project) and development of learning materials adapted by teachers to the process (30 hours)

Example

A holistic approach to humanity's main challenges – Socioeconomic and environmental aspects realized through an interdisciplinary project: Sunflower cultivation

Teachers developed assignments for students in the fields of science, mathematics, art and languages. The assignment framework included identifying goals, implementing thinking skills, combining multiple intelligences, social-emotional learning and assessment tools.

Summary of Stage B

Collaborative learning through the JIGSAW of the learning materials. Each group has an expert from each field.

Methodology

Mixed methods: A qualitative research with the addition of quantitative aspects.

Participants: 20 primary school teachers from different disciplines teaching.

Tools:

- Pre- and post-course questionnaires that included references to steam components.
- An assignment to reflect the stages of their own Design Engineering process.
- Social-emotional learning questionnaire

Partial Findings and Implications

Through the course, the teachers gained confidence and managed to realize much of the process, to the point of their being able to implement what they learned in the field.

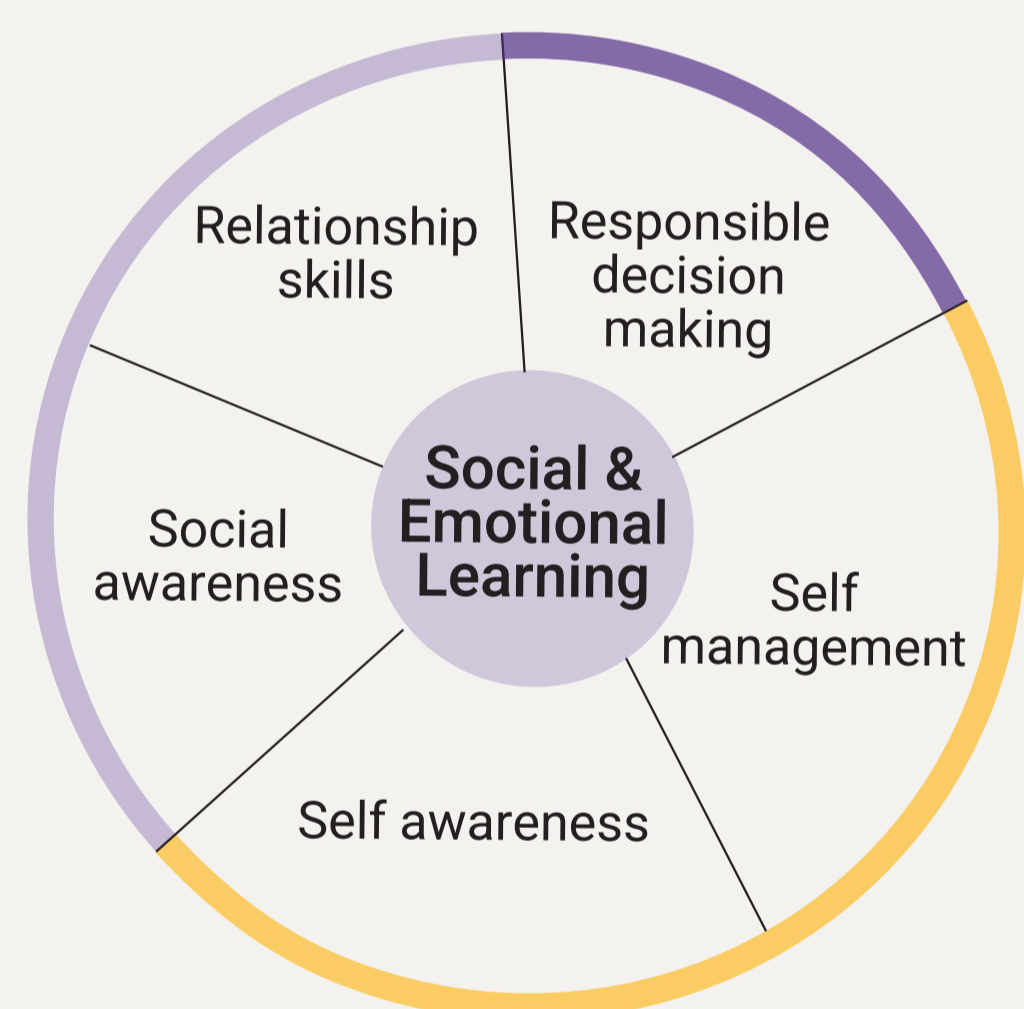
Teachers' responses at the conclusion of the course conveyed their feelings about the importance of studying the STEAM approach.

A unique element that was examined in this study is SEL expression for implementation in stages of the Design Engineering process. We found that emphasizing this topic in the course opens the door to its application in the field.

Recommendations for the Future

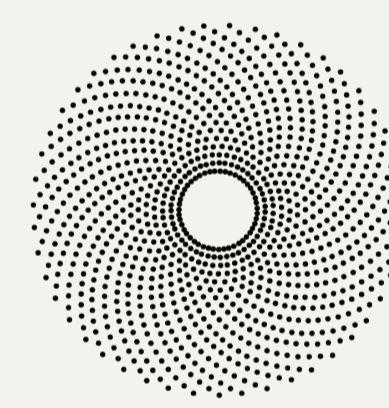
Every Science, Mathematics and Technology teacher should deepen their knowledge of and gain experience in the STEAM approach. When teachers acquire more understanding of the subject, their teaching methodology is likely to be more correct and meaningful and support their students' social mobility processes.

The CASEL (2020) competencies



← communities ← schools ← classroom

Mathematics



What's the mathematical wonder of the sunflower? Fibonacci Golden Ratio Series

Nutrition, Cooking



Many important nutrients in sunflower seeds

Sciences



Sunflower plant structure – Concepts and processes.

Art



Van Gogh – The Sunflower: How to create a color? What mood is being reflected?

Languages and literature



Stage C

Among pupils

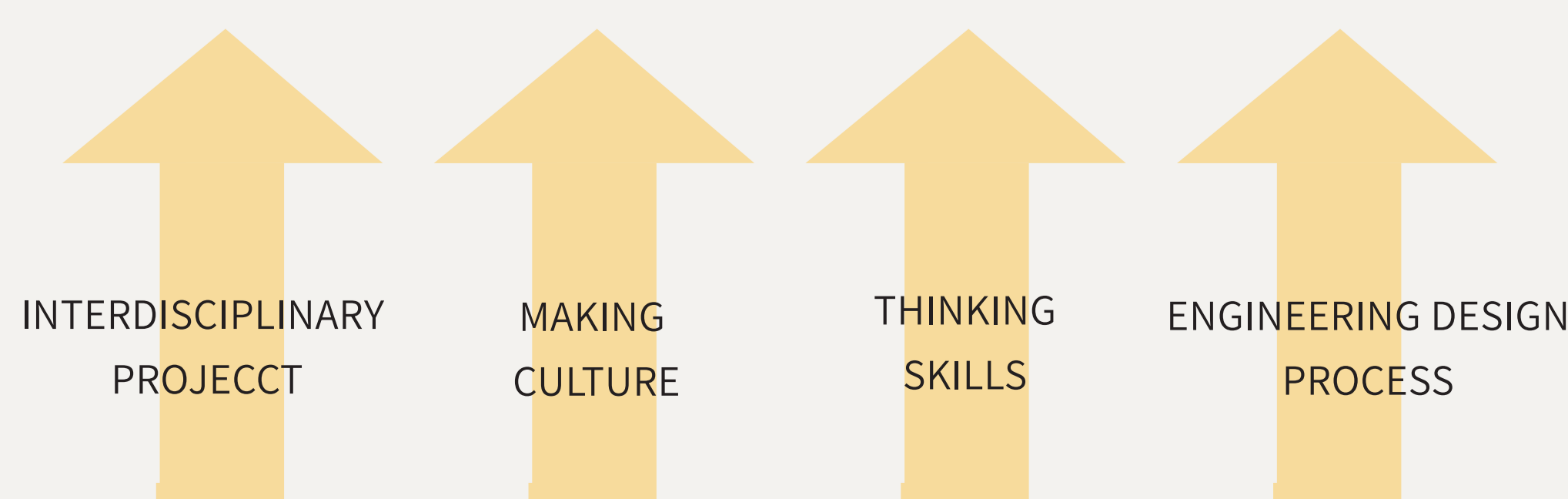
(60 hours)

- Guided implementation of the interdisciplinary project
- Teachers' reports of SIS implementation using teachers and pupils' stories and photographs
- Other topics:
 - Industry Tour and Reporting
 - Identify a global goal from the SDGs.



The Sustainable Development Goals (SDGs) were adopted by the United Nations in 2015 as a universal call to action to end poverty, protect the planet, and ensure that by 2030 all people enjoy peace and prosperity.

KEY ISSUES IN TRAINING



Nachshon Michal, Research and Development of STEAM Education, ORANIM Academic College of Education, TIVON, ISRAEL

Rom Amira, Education and Psychology department, The Open University of Israel, RA'ANANA, ISRAEL