School of Creative Solutions

Kurt Haim & Wolfgang Aschauer
University of Education Upper Austria

In a world of increasing globalization and technological progress, requirements are shifting from solving standardized tasks to increasingly complex, nonroutine activities (Autor et al., 2003). Young people must learn to solve real problems for which there are no ready-made strategies to shape tomorrow's world in an innovative, resource-conserving, and sustainable way (Kind & Kind, 2007; Marope et al., 2017). To foster students´ creative problem-solving skills and to transform schools into an innovative thinktank, a team of teachers and researchers established the SCHOOL OF CREATIVE SOLUTIONS (SCS) as an initiative to encourage creative problem-solving in schools. Therefore, the SCS initiative comprises two special programs – "FLEX-BASED LEARNING (FBL)" & "INNOVATIVE FOCUS (InFOCUS)" – including together a bundle of over 20 techniques.

Flex-Based Learning

The theoretical foundation for the FBL program is provided by the concept of scientific creativity. As a domain-specific creativity, it includes both domain-specific and general creativity competencies (Ayas & Sak, 2014; Barbot et al., 2016; Hadzigeorgiou et al., 2012; Hu & Adey, 2002; Huang & Wang, 2019). Domain-specific competencies include generating and testing hypotheses (Klahr, 2002; Sternberg et al., 2020), problem-finding (Hu et al., 2010; Hu & Adey, 2002; Sternberg et al., 2020), and problem-solving (Hu & Adey, 2002). General creativity competencies include divergent thinking (Ayas & Sak, 2014; Hu et al., 2010; Hu & Adey, 2002), association and bisociation, metacognition (Lin et al., 2003), and imagination (Hadzigeorgiou et al., 2012; Kind & Kind, 2007).

The FBL program was developed specifically for STEM subjects to promote creative problem-solving as well as to authentically teach and promote scientific methods of working and thinking. The FBL program can be characterized as follows:

1. Since scientific creativity requires a wide range of creative skills, the FBL program is a collection of different techniques.
2. For increasing students' problem-solving skills, it specifically promotes flexibility, as it is essential for solving real world problems (Runco, 2004). This explains the name of the program.
3. Since the promotion of creativity should always be accompanied by elements of metacognition (Lin et al., 2003), the FBL program also includes specific tools for metacognition as well as for strengthening the creative personality.
4. Worksheets have been developed for all interventions so that teachers can easily implement the FBL program in their classrooms.

5. In many FBL techniques, students work in multiple-mode discussion cycle called Listen-Think-Pair-Share (Lyman, 1981). This setting creates ideal conditions for creative work because there is a balance between individual and group work. Specifically, in this cycle, students are trained to listen carefully to the task ("listen"), think about it alone ("think"), discuss their answers in small groups ("pair") and finally, share the results with the whole class ("share"). This cycle enables social inclusion by involving the whole class.

Three FBL tools – Thinkflex, Flexperiment, and Woseco – are presented in the workshops and briefly described below. For a more detailed description of the FBL program, see Haim & Aschauer (2022).

A high flexibility in thinking is characterized by the fact that the ideas generated for a problem come from different perspectives. This flexibility is specifically trained by the Thinkflex tool, in which the students can specifically change their thinking styles and thus adopt a wide variety of perspectives. For this purpose, a so-called perspective check was developed, which guides the students step by step from one thinking perspective to another.

Originality is provoked in the FBL program by the so-called Flexperiments. These are science experiments in an open setting in which students have to generate many different solutions to a problem and implement them experimentally. In order to come up with many possible implementations, they have to break down the functional fixedness of the given everyday materials, which often results in original solutions.

Woseco is an acronym for word-sentence constructions and trains the ability of original association. For this purpose, a student is given a technical term in a repetitive setting and must formulate with a freely selectable second technical term a new meaningful sentence.

Innovative FOCUS

The InFOCUS program aims to strengthen young people's self-efficacy and train them to become successful problem solvers by working in teams on a specific problem. Thus, the IPS program based on modern concepts of creativity (e.g., Runco & Jaeger, 2012; Runco & Acar, 2012) and includes a collection of widely accepted creativity techniques such as Design Thinking, Morphological Analysis, Reversed Brainstorming, etc., which are used in business in the field of innovation management. The used creativity techniques guide students step-by-step through the creative process, from problem definition, through research and brainstorming, to the selection of appropriate ideas. However, a creative process is always determined by the quality of teamwork and the personality traits of individual participants. Therefore, more than in the FBL program, the InFOCUS program focuses on teamwork competence and creative personality.

During the workshop we present one of the creativity techniques and discuss the conception of the IPS program. More detailed and additional information about the InFOCUS program as well as descriptions of realized projects can be found at:

- https://www.school-creative-solutions.at/en/
- https://www.school-creative-solutions.at/en/creative2innovation

Literature

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