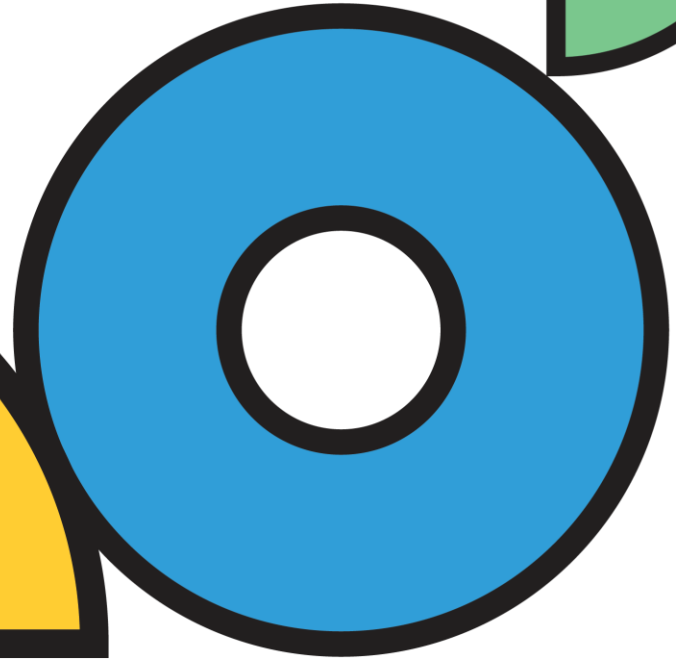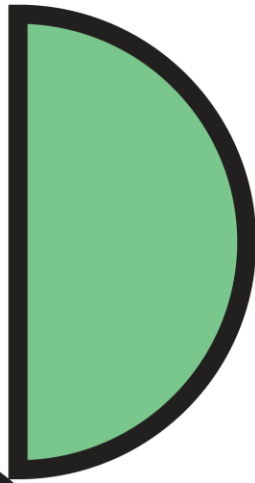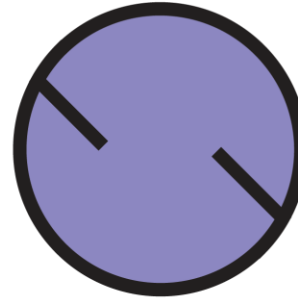| Description of the activity:	Theoretical explanation with practical examples. The theoretical part includes brainstorming sessions and sharing experiences.
Target group(s):	Primary schools teachers and basic school STEAM subject teachers
Keywords:	5E model, organizing of STEAM, STEAM management
Duration of activity:	1 h
Description of activity environment and materials needed:	In this activity, you will learn about the 5E model, the possibilities of STEAM management at school, what is it, and how to organize it. Activity includes: •presentation and explanation of the topic, •presentation and analysis of practical examples, •brainstorming session, •sharing experience •creation of education activity plans through the lessons (lessons schedule). For implementation needed: computer with an internet connection, multimedia.
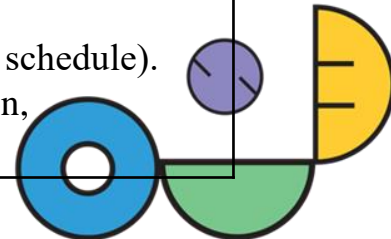
Teaching and learning strategies: *The 5E model and organizing STEAM*

5 Model E (stages)

5E etapai:

1. *Engagement*
2. *Exploration*
3. *Explanation*
4. *Elaboration*
5. *Evaluation*

Figure 1. 5E Learning cycle.

Durdane Bayram-Jacobs, Godfried Wieske, Ineke Henze, 2019

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5 Model E (stages)

DOSE
DEVELOPMENT OF STEAM EDUCATION

Problem-based learning

Students learn by working in groups and solving open-ended problems.

5 E Model

Students acquire and apply skills by developing a project over a long period, in which they conduct a detailed study of a specific topic or question and prepare a presentation.

Project-based learning

Inquiry-based learning

Students pose questions, and problems, or create scenarios based on established (received) facts.

5 Model E (stages)

Figure 1. 5E Learning cycle.

1. Engagement *(brainstorming, mind mapping, creative tasks, etc.)*

2. Exploration *(expert method, research methods, etc.)*

3. Explanation *(expert method, CERR, etc.)*

4. Elaboration *(prototipų, maketų, pavyzdžių darymas ir pan.)*
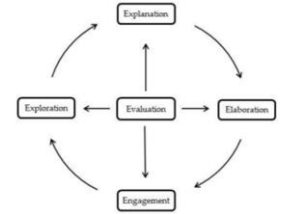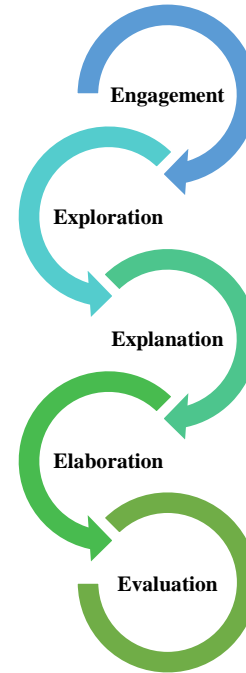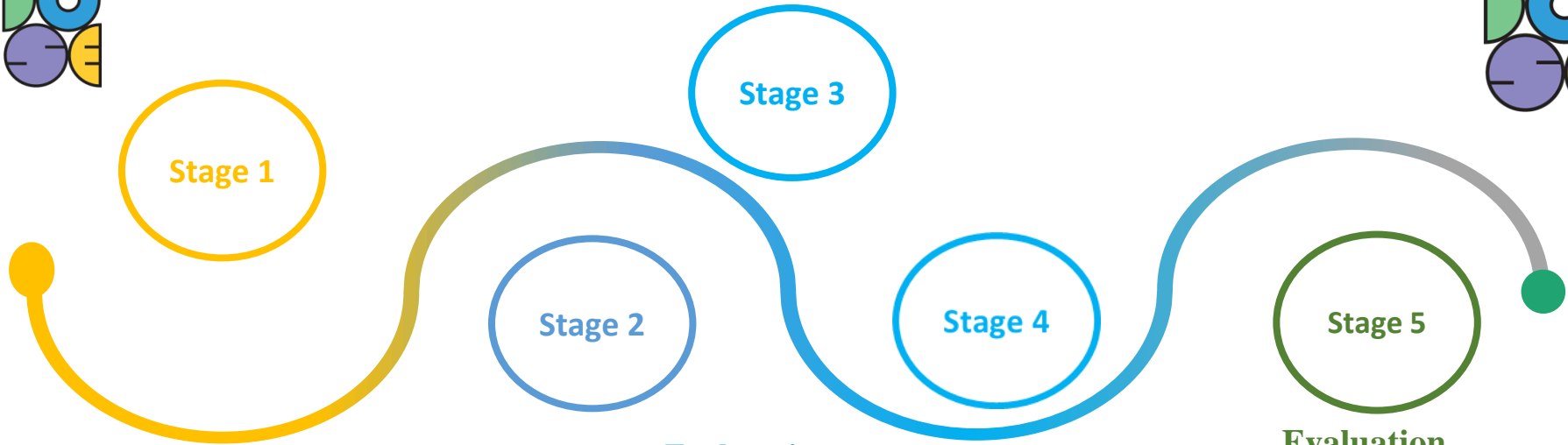
5. Evaluation *(reflection, self-assessment methods)*

Engagement

Exploration

Explanation

Elaboration

Evaluation

Stage 1

Stage 2

Stage 3

Stage 4

Stage 5

Engagement

Incorporate/incorporate students in problem-based learning, etc.;
Methods: reading, brainstorming, mind mapping, creative tasks, etc.

Exploration

Inquiry-based learning (structured, guided, open);

Students: observe, question, research, collaborate, predict, reflect, etc. In the classroom and/or laboratory.

Explanation

Students justify their understanding, share it with their peers, seek new explanations, and apply different models of explanation. Conceptually understand the phenomenon/data. Argumentation (CERR, etc.).

Elaboration

Students apply science concepts in new contexts and expand their understanding. The teacher guides the process by providing the necessary resources and feedback.
Students create, develop, and detail options for solving a problem.

Evaluation

Evaluation takes place during the entire learning process (after each stage); **students** evaluate and self-evaluate their understanding and acquired abilities (reflection); the most used **formative assessment method**.

Analysis of practical examples:

Light Graffiti

An example of a STEAM activity for primary education
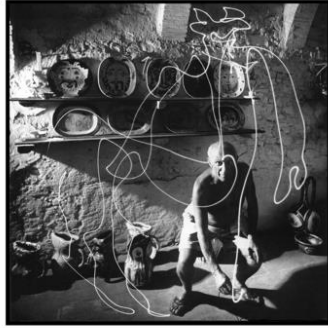
Materials needed:
- 5 artworks with light graffiti
- Camera with adjustable shutter speed or Ipads / Iphones with the app "slow shutter" (one for two groups)
- Lights (pointers, bicycle lights, flashlights, light on a mobile phone, ... (with thinner light beams clearer drawing) (several per group)
- Different colors of crepe paper
- By holding crepe paper in front of the light source, you can vary the colors of the light
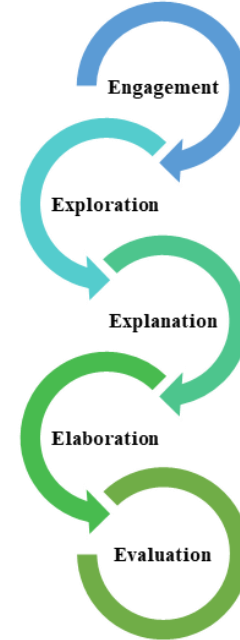- Some pieces of paper and writing materials

The students discover how to create art by using light graffiti. In the first phase, the students explore the possibilities and points of attention when creating a light graffiti work by doing small tasks. In a second phase they make a story based on 4 photos.
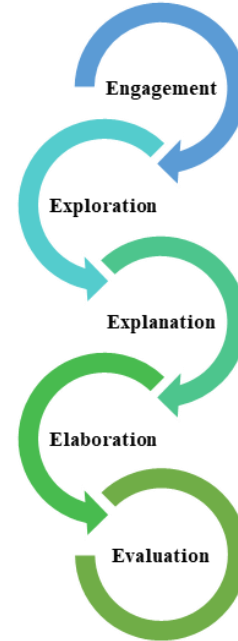
Problems to be tackled:
- Students discover musical domains, their working methods and design tools, they choose purposefully and combine them in order to express themselves expressively
- Students can think logically and algorithmically
- Students develop digital audiovisual skills
- Students can technically use the audiovisual media to realize a product

Engagement

Exploration

Explanation

Elaboration

Evaluation

DOSE project material

20 min. for introduction: samples and theory

Analysis of practical examples:

1. Divided into groups: small groups of 4 participants, all different, learning differently.
2. Creative Task: Develop a plan of lessons for how your group will teach the chosen theme to suit all members of the group. For example, topics: "Light graffiti"
3. Presentations of group proposals.

DOSE project material

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CREATIVE TASK (30 MIN.)

REFLECTION

"Coming together is a beginning, staying together is progress, and working together is a success."
Henry Ford