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Title of the STEPAM Unit: Shadow in motion

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RELATED SUBJECTS	AGE GROUP OF THE STUDENTS	TOTAL ACTIVITY TIME	LEARNING OBJECTIVES DURING THE LESSON SUBJECT-SPECIFIC COMPETENCIES	LEARNING OBJECTIVES AFTER THE LESSON
Science, Mathematics, Physical Education, Language, Arts	1-4 grade (6 to 11 years old)	90 minutes	Learning about the characteristics and conditions of shadow formation Geometric shapes and distance measurements. 3D creativity. Drawing and design Construction of objects for the show Development of movement coordination and concentration	Students can recognizes materials that make shadows and penumbras Students can observes the dependence of the size of the shadow on the distance of the light source. Students distinguish light-transmitting and non-transmitting materials The students improved their coordination and concentration

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OVERVIEW: TOPIC & PURPOSE

The first activity involves making shadows with the hands, so that later they will learn about the way shadows are created and the materials that have shadow and penumbra. Students investigate what determines the size and shape of a shadow using mathematical knowledge. In the further course of the activity, students in groups create characters for the shadow play according to the given theme. When creating characters and props for the play, students use different materials, art techniques and basic engineering skills. After creating the material, the students exercise themselves using low-intensity games that require coordination and concentration. after all the activities in the final part of the class, the students perform a performance.

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ACTIVITY PREREQUISITES -

STEAM ELEMENTS

ELEMENT 1: context presentation	What are the characteristics of shadows in everyday life? What are the conditions for the formation of shadow and penumbra? Using shadows in art.
ELEMENT 2: creative design	Creating characters and objects for shadow theater Using different materials in order to boost the creativity in children. Using different materials in construction techniques. combining real objects, their shadows and textures to create static art installations.
ELEMENT 3: emotional and social learning	Learning cooperation and communication skills through working in groups. Experiencing focus and concentration during the building process. Experiencing focus and concentration during the exercises.

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STEAM SUBJECT ELEMENTS

STEAM SUBJECTS	SCIENCE	TECHNOLOGY	ENGINEERING	Physical Education	ARTS	MATHEMATICS
SHORT INTRODUCTION TO RELATED SUBJECT ELEMENTS	The creation of shadow, shadow and half-shadow, transparent and invisible materials, propagation of light, shape and size of the shadow.	Using electronical devices (Mobile phones / light on phone) to create a shadow. Using mobile app. Using projector.	Modeling objects for the "Theater of shadow". using different materials and techniques (gluing, cutting, joining).	Catch your shadow. Differnet way of movement – Running, skiping, hopping, crowling etc. Games Copy Paste	Hands-on modeling, modifications of the design, creating structures for the theater of shadows. Shadow and semi-shadow, transparent and opaque materials	Measuring length

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SYLLABUS

LESSONS	SUBJECTS	TOPIC OF THE UNIT	LEARNING OBJECTIVES DURING THE LESSON: SUBJECT SPECIFIC COMPETENCIES	LEARNING OBJECTIVES AFTER THE LESSON: STEAM COMPETENCIES
1	Science, Mathematics	Making shadow models with hands. Modifying shadow models based on scientific principles, transformations. Recognition of materials wich make shadow and half shadow, transparent and opaque materials. Modifying models based on aesthetic motives.	Students observe different shapes of shadows in the environment. Students learn how shadow and penumbra are created. Under what conditions does the shape and size of the shadow change.	Students learned how a shadow is created and under what conditions its shape and size change. The student use to creativly combine different material and design (<>>>>) Students learned that the same geometric bodies (cylinder, cone, pyramid, cube, cuboid) can create different shadows depending on

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		Recognition of different geometric shapes of the shadows.	The students confirm knowledge about various geometric shapes.	the position and angle at which the light falls.
2	**Engineering, &** Arts. **Physical education,** Technology **Mathematics,**	Creating characters for shadow theater Different kind of movement. Development of motor skill (coordination). Team work and team building. (animation and projector features?) Using a computer and a video beam, a picture is projected on the wall with moving geometric objects that the students need to avoid, jump or catch depending on the task or object.	Students use their creativity to create the aforementioned characters for shadow play. Students construct characters for the shadow play by combining different materials and art techniques. The students are physicaly active and they develop their physical skills. They also learn to work in the team and maintain focus and concentration.	**Student learn how to bild different structure using different materials.** Students are more active and healthy. Improving their motor skills. Students learn about the formation of shadows in nature, the influence of the position and distance of the sun on the size and shape of the shadow during the day and year. The students practice distance measurements.

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			The students confirm knowledge about various geometric shapes.	

INSTRUCTIONAL PLAN BY LESSON (COPY AS MANY TIMES AS NEEDED)

LESSON Grade 3-4 Science, Engineering, Physical Education, Art (Language) and Mathematics

TIME PLAN	TEACHING & LEARNING ACTIVITIES	MATERIALS	LEARNING OBJECTIVES
INTRODUCTION **(5 minutes)**	Introducing students to the different shadow objects. In the introductory part of the lesson, students use their hands to make	Board and source of light. Attached PDF slides: Slide nr. 1-4	students are introduced to the way different forms of shadows are created.

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	shadows in front of the blackboard. (First, the teacher shows an example of a shadow with his hands. After that, students come forward to demonstrate, finally students are given examples from which each student chooses one to show on the board).		
LEARNING ACTIVITIES (60-70 minutes)	Getting to know the basic characteristics of shadows and the conditions of their creation (straight-line movement of light, transparent and opaque materials, shadow and penumbra). Student investigation of what affects the size and shape of the shadow (geometric shape of the object, distance of the object from the light source, spiral of the object and the angle at which the light falls, different shapes of the	objects of different geometric shapes (Simple shapes that children recognize (circle, cube, cuboid, cylinder, cup and pyramid). Transparent and opaque objects (opaque and transparent bottles, glasses and bricks). Different transparent foils. Attached PDF slides: Slide nr.5 -8. Transparent foil, black and white paper. Cardboard and paper material, scissors, wooden sticks and glue to make	students learn how a shadow is created in nature and under what conditions its shape and size change. They use units of measurement for length. They determine body shapes from geometry. **The student use to creativly combine different material and design (<>>>>)** Students learn, repeat and perfect different movements that develop coordination of movements.

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	shadow of the same object).(Approx. 10-15 min.) Students are divided in two groups. 1st group Students read the given motifs on transparent foil. after that, using a black and white background, students observe the influence of the amount of light on the visibility of objects. 2nd Students create art installations by combining realistic shadow objects and drawing. (Approx. 10 min.). (PPT slide 12). Students are divided into several groups (each group consists of 5-6 students). The teacher gives pre-prepared scenarios (The story of the three pigs, Hansel and Gretel,	characters and objects for shadow theater. Attached PDF slides: Slide nr.8 -10.	

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	Little Red Riding Hood, the story of the dinosaurs, etc.), based on which the groups should create character models for the shadow theater.).(Approx. 30-35 min.) Students play several games where the goal is for students to carefully observe the student in front of them and be his shadow. Copy paste game and add one more game.).(Approx. 20-25 min.)		
WRAP-UP & EVALUATION (15-20 minutes)	The students, previously divided in groups, hold a theater performance for which they created the characters and props necessary for the play according to the script.	A larger box representing a theater scene. Mobile phones to create a light for shadow theater	Learning about how to create shadow and penumbra using light and different materials. They learn to work and cooperate in a group. They learn educational things depending on the specific play.

EVALUATION PLAN BY LESSON

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LESSON	EVALUATION CRITERIA	EVALUATION METHOD
1, 2	**whether students can make some of the shadow models using their hands.**	Demonstration
	Can students make shadows of different shapes and sizes using objects from the environment and varying the distance and position of the light source	Observation, comparing products
	Did the student presented creativity in creating/ crafting objects (used given/suggested art technics)	Observation and evaluation of creativity (technics) art craft.
	Did the students cooperate with each other in the groups	Observation, self-evaluation of groups / students.
	Is the students able to implement what they learned and present it during the Play in Shadow theater?	Observation, peer-review of presentation materials
	Homework done and uploaded in padlet	Observation & peer-review

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HOMEWORK

Students have the task to do the activity of the opposite group. For example. students who worked with transparent foil have the task of making art installations by combining realistic shadow objects and drawing, and conversely students who made art installations have the task of drawing on transparent foil. The completed task should be recorded in video format and attached to the padlet.

NOTES -

ACTIVITY SHEETS TO BE LINKED -

EVALUATION MATERIALS TO BE LINKED -

REFERENCES / SUPPORTING MATERIALS TO BE LINKED

PDF / PPT slides:

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