



Title of the STEAM Unit: Beyond Sight - Exploring Geometry and Art Through the Senses

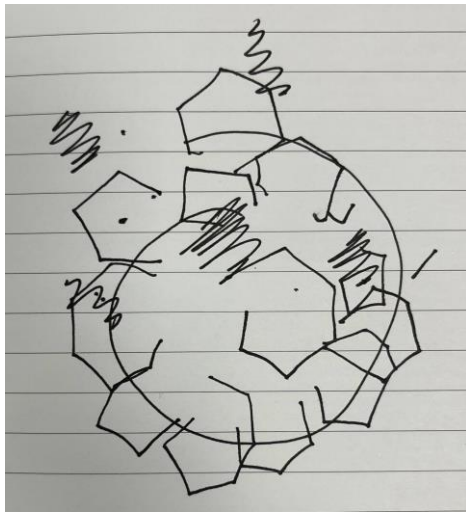
AUTHOR: FLORENTINE BAUMANN / NELSON MANDELA SCHOOL / GERMANY

RELATED SUBJECTS	GRADE RECOMMENDATIONS	TOTAL ACTIVITY TIME	LEARNING OBJECTIVES DURING THE LESSON SUBJECT-SPECIFIC COMPETENCIES	LEARNING OBJECTIVES AFTER THE LESSON
<p>Art Mathematics Biology Geography</p>	<p>Year of 8</p>	<p>18 h</p>	<ul style="list-style-type: none"> ● Perception with other senses than sight ● Sensitivity towards tactility and sound ● Teamwork / social skills ● Art: drawing, folding, constructing, printing ● Math: investigating shapes and solids (2D to 3D), perception of angles and regularities/symmetries ● Understanding sensual perception 	<ul style="list-style-type: none"> ● Documentation of learning process ● Reflection of experience and outcome ● Understanding living with special needs ● Focusing on the use of specific senses ● Understanding transcurricular learning

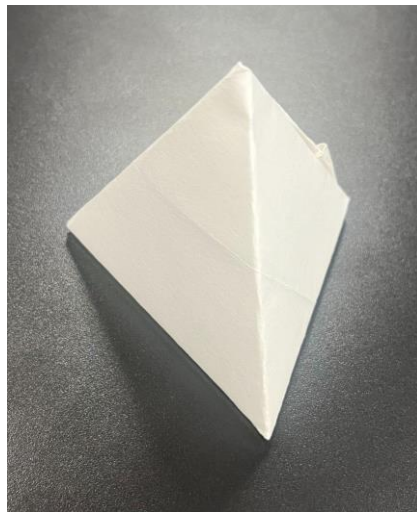


OVERVIEW: TOPIC & PURPOSE

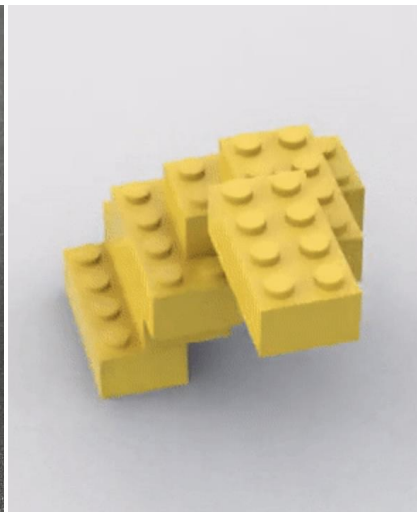
Our aim is to highlight the impact of blind-visualization processes on learning with a focus on the interaction between Mathematics and Arts. We want to let the students experience the powerful combination of visual, haptic and textual contexts. We combine different artistic approaches including drawing, stacking LEGO-bricks and paper-folding while being blindfolded.



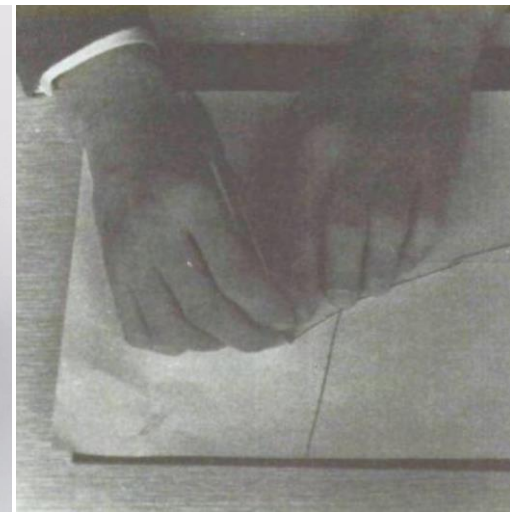
Blindfolded drawing of a soccer-ball



Folded tetrahedron with A5 paper



Stacking LEGO bricks





ACTIVITY PREREQUISITES



Blindfolds (e.g. recycling unused medical masks for this purpose) and various objects, according to the availability, e.g.: gold paper, rubber mats, old ballpens, tetra pack from cafeteria, origami paper, A5 paper, Visual Journal, solids from math department, drawing paper A4, paint smocks, rubber gloves, block printing devices, audio recording device (phone), Jenga game, LEGOs, eyeglasses boxes, 4dframes, cardboard square format, 16 different textures that have a color or can be colored (to be collected by students)

STEAM ELEMENTS

ELEMENT 1: context presentation	Real-world / scientific / artistic context of the unit
ELEMENT 2: creative design	Summary of creative activities in the unit
ELEMENT 3: emotional and social learning	Summary of emotional and social skills development in the unit





STEAM SUBJECT ELEMENTS

STEAM SUBJECTS	SCIENCE	TECHNOLOGY	ENGINEERING	ARTS	MATHEMATICS
SHORT INTRODUCTION TO RELATED SUBJECT ELEMENTS	Activating the human senses, particularly all other than the sense of vision, focusing on the tactile sense, experiencing geometry through the activation of a range of different learning channels	Using smart devices, e.g. mobile phone for documentation of the activities	Which parts of the unit are connected to engineering learning? Constructing with LEGOs and 4Dframes, figuring out balance, friction etc. with Jenga, paper crafting with origami strategies	Block printing, relief printing, modelling, collaging (tactile board), drawing, embossing, graphic design (Visual Journal)	Understanding and practicing geometry, calculations of areas, construction of shapes and solids, calculations

SYLLABUS

LESSONS	SUBJECTS	TOPIC OF THE UNIT	LEARNING OBJECTIVES DURING THE LESSON: SUBJECT SPECIFIC COMPETENCIES	LEARNING OBJECTIVES AFTER THE LESSON: STEAM COMPETENCIES





1	Art / Biology / Math	Tactile Board	<ul style="list-style-type: none"> • Develop problem solving skills: find the maximum number of regions that can be formed with n-lines. • Exploring different kinds of textures that derive from daily life materials • Arranging 16 shapes in a square • Exploring the tactile sense • Reference to Laszlo Moholy-Nagy's Bauhaus pedagogy 	<ul style="list-style-type: none"> • Understanding the transcurricular aspect of using the tactile sense • Teamwork • Phenomenal problem solving • Design thinking • Mathematical problem-solving skills: generalizing from particular cases, basic combinatorics, proving.
2	Art / Bio / Math	Tactile Board	<ul style="list-style-type: none"> • Sketching, cutting, using a stencil as a model to create the "puzzle", arranging, glueing • Playing blindfolded with the tactile board 	
3	Art / Math	Origami	<ul style="list-style-type: none"> • Learning how to fold simple origami structures (polygons and solids) blindfolded and by acoustic instructions only • Applying the tactile sense to creating exact 3D shapes made of paper • Listening and transferring instructions 	<ul style="list-style-type: none"> • Understanding the transcurricular aspect of using the tactile sense • Teamwork • Phenomenal problem solving • Design thinking • Exploring geometrical properties and symmetry • Using origami to prove
4	Art / Math	Origami	<ul style="list-style-type: none"> • Creating an audio recording with the mobile phone to be used as instructions for origami folding 	<ul style="list-style-type: none"> • Teamwork • Media Literacy (audio recording) • Discussion & evaluation





			<ul style="list-style-type: none"> Trying out the recorded instructions and evaluating the outcome 	<ul style="list-style-type: none"> Using formal language to communicate mathematics verbally.
5	Art / Math	Embossing Imprinting Block Print	<ul style="list-style-type: none"> Creating a block printing device with imprinted ballpen lines on Tetra Pak (geometric ornamentation) 	<ul style="list-style-type: none"> Enhanced Spatial Awareness and Geometric Understanding Creativity and Innovation Critical Thinking and Problem-Solving Collaboration and Communication Sensory Exploration and Multisensory Learning Empathy and Understanding of Diverse Perspectives <p>STEAM Competencies Developed:</p> <ul style="list-style-type: none"> Interdisciplinary Integration Creative Problem-Solving Technical Skills Critical Analysis Collaborative Skills Sensory Awareness and Inclusion
6	Art / Math	Embossing Imprinting Block Print	<ul style="list-style-type: none"> Using the Tetra Pak printing device to create block prints - a) seeing, b) blindfolded with partner 	
7	Art / Math	Embossing Imprinting	<ul style="list-style-type: none"> Teacher tutors the blindfolded students to approach geometrical problems by the tactile sense 	
8	Art / Math	Embossing Imprinting	<ul style="list-style-type: none"> Illustrating blindly a geometrical math problem as imprint on stronger paper with rubber mat underneath Have another student understand the illustration by touch 	
9	Art / Math	Documentation in a Visual Journal	<ul style="list-style-type: none"> Explaining work process and documenting tasks in a Visual Journal 	<ul style="list-style-type: none"> Exchanging documentation in Visual Journal





			<ul style="list-style-type: none"> • Layout / graphic design • Illustration of STEAM experiences • Reflection on perception 	<ul style="list-style-type: none"> • Discussing experiences and comparing documentations
10	Art / Bio	Relief print	<ul style="list-style-type: none"> • Printing textures of tree trunk slices (alternatively other interesting rhythmic structures) • Transferring those structures as layers onto cardboard to be stacked as a mountain • Arrangement of mountains (topographic) blindfolded vs. seeing 	<ul style="list-style-type: none"> • Realizing the age of a tree can be depicted by the rings of a tree trunk • Understanding the meaning of contour lines and contour intervals on a map. • Depicting height in a landscape with 3D
11	Art / Geography	Relief creation and relief exploration	<ul style="list-style-type: none"> • Turning the despicable structure into a 3D model using clay - blindfolded (careful - mess - cover workspace and wear paint smock) • Using a variety of potatoes, ruler, and markers, produce a contour map. 	<ul style="list-style-type: none"> • Understanding the importance of having numerical values on contour lines. • Read aloud a map including contour-lines, interpreting if the map represents a mountain, a depression, a crater or a series of moats. • Match contour maps and 3-D models of mountains when blindfolded.
12	Art / Bio	Blind drawings	<ul style="list-style-type: none"> • Develop observational skills without the reliance on sight. • Enhance tactile and auditory perception to interpret and create art. 	<ul style="list-style-type: none"> • Enhanced Observation Skills • Improved Drawing Techniques • Sensory Integration





			<ul style="list-style-type: none"> • Foster imagination and creativity through sensory restriction. • Encourage descriptive communication and verbal articulation of visual concepts. 	<ul style="list-style-type: none"> • Empathy and Accessibility • Observational Skills • Creative Expression • Interdisciplinary Thinking • Sensory Exploration • Empathy and Inclusivity • Problem-Solving
13	Art / Bio	Blind drawings	<ul style="list-style-type: none"> • Strengthen memory recall and spatial awareness through drawing from description or memory. • Cultivate patience and attentiveness to detail in a non-visual context. • Promote collaborative storytelling and shared visual interpretation without sight. • Enhance the ability to give and receive constructive feedback based on non-visual art creation. 	
14	Art / Math	3D Constructions	<ul style="list-style-type: none"> • Constructing with 3D cardboard boxes (containers for glasses) • Playing Jenga blindly (pairs) • Constructing identical forms with LEGOS - the more pieces the more difficult • Constructing polyhedrons blindly with 4dframes • Exploring haptically properties of polyhedral shapes 	<ul style="list-style-type: none"> • Enhanced spatial reasoning and understanding of geometric principles through tactile exploration. • Improved problem-solving skills and creativity in constructing and deconstructing 3D shapes. • Development of teamwork and communication skills
15	Art / Math	3D Constructions		
16	Art / Math	3D Constructions		
17	Art / Math	3D Constructions		





				<p>through collaborative construction tasks.</p> <ul style="list-style-type: none"> • Increased awareness and appreciation of the tactile properties of different materials and shapes. • Engineering and Design Thinking • Mathematical Reasoning • Collaboration and Communication • Creative Innovation • Sensory Exploration
18	Art / Math	Documentation in Visual Journal	<ul style="list-style-type: none"> • Explaining work process and documenting tasks in Visual Journal. About the Visual Journaling method the teachers can watch the presentation by Florentine Baumann (start at 1 hour 47 min: https://www.facebook.com/watch/live/?ref=watch_permalink&v=395482905495367) • Layout / graphic design • Illustration of STEAM experiences • Reflection on perception 	<ul style="list-style-type: none"> • Exchanging documentation in Visual Journal • Discussing experiences and comparing documentations





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

LESSON 1

TIME PLAN	TEACHING & LEARNING ACTIVITIES	MATERIALS	LEARNING OBJECTIVES
INTRODUCTION (10 minutes)	Intro to making a tactile board: "We will explore different textures and create a tactile board to understand shapes and patterns through touch."	Prior to lesson instruct the students to start collecting different materials with different <u>structures</u> . Visual presentation, examples of different textures	Introduction to tactile learning and its significance.
LEARNING ACTIVITIES (30 minutes)	Creating a tactile board: "Choose textures that you find interesting, sketch your board design, and start creating your tactile board."	paper, plastic, carpet, net cloth, etc. - materials with different texture	Develop problem-solving skills, explore textures, and begin tactile board creation.
WRAP-UP & EVALUATION (15 minutes)	Students share their work-in-progress and reflect on the process: "Present your tactile board so far and share what you've learned about working with different textures."	Created tactile boards	Reflect on the tactile sense exploration and teamwork.





LESSON 2

TIME PLAN	TEACHING & LEARNING ACTIVITIES	MATERIALS	LEARNING OBJECTIVES
INTRODUCTION (5 minutes)	Recap of the previous lesson and objectives for completing the tactile board: "Today, we will complete our tactile boards and explore them through touch."	Incomplete tactile boards from the previous lesson.	Understanding the day's goals and recalling previous learning.
LEARNING ACTIVITIES (30 minutes)	Continue with creating the tactile board	Tactile boards, blindfolds, additional textures if needed.	Complete tactile board creation, enhance sensory exploration, and teamwork.
WRAP-UP & EVALUATION (10 minutes)	Group discussion on the experience, challenges faced, and what was learned about using tactile sense for learning: "Let's discuss what it was like to explore the boards blindfolded and what we learned from this experience."	Tactile boards, class discussion.	Reflect on tactile learning, problem-solving, and the importance of sensory exploration in understanding geometry and materials.

LESSON 3

TIME PLAN	TEACHING & LEARNING ACTIVITIES	MATERIALS	LEARNING OBJECTIVES
INTRODUCTION (5 minutes)	Introduction to origami as an art and mathematical practice. Explanation of	Origami paper, blindfolds	Introduce origami folding and the concept of learning through tactile sense.





	<p>today's challenge: folding origami blindfolded: "Today, we'll explore the tactile sense by folding origami structures without sight, relying solely on verbal instructions."</p>		
<p>LEARNING ACTIVITIES (35 minutes)</p>	<p>Students are paired, one blindfolded and the other giving verbal instructions to fold a simple origami structure. Swap roles halfway through: "Work in pairs, with one guiding verbally and the other folding blindfolded. Focus on clear communication and tactile exploration."</p>	<p>Origami paper, blindfolds.</p>	<p>Enhance teamwork, communication skills, and understanding of geometric properties through tactile sense.</p>
<p>WRAP-UP & EVALUATION (5 minutes)</p>	<p>Discussion on the experience, challenges, and what was learned about communication and origami: "Share your experience, what was challenging, and what you learned about origami and teamwork."</p>	<p>Completed origami structures.</p>	<p>Reflect on the use of tactile sense in learning and the importance of clear verbal instructions.</p>





LESSON 4

TIME PLAN	TEACHING & LEARNING ACTIVITIES	MATERIALS	LEARNING OBJECTIVES
INTRODUCTION (5 minutes)	Recap of previous lesson's learning and introduction to today's activity: folding origami using pre-recorded audio instructions: "Building on our last session, today we'll use audio instructions to fold origami. You'll record instructions, then swap with another group to follow theirs."	Mobile phones or other recording devices, origami paper.	Introduce the concept of media literacy and verbal communication in mathematics.
LEARNING ACTIVITIES (35 minutes)	Students create audio recordings of origami folding instructions, then swap with another group to follow their instructions: "Create clear, step-by-step origami folding instructions. After recording, swap with another group and follow their instructions."	Origami paper, mobile phones or other recording devices.	Develop media literacy, enhance teamwork, and practice using formal language to communicate mathematical concepts.
WRAP-UP & EVALUATION (5 minutes)	Groups share their origami creations and discuss the effectiveness of the	Completed origami structures, recording devices.	Evaluate the effectiveness of verbal instructions, reflect on teamwork and





	<p>instructions they followed: "Present your origami and discuss how effective the audio instructions were. Reflect on the clarity of communication and teamwork."</p>		<p>communication skills, and understand the role of media literacy in learning.</p>
--	--	--	---

LESSON 5

TIME PLAN	TEACHING & LEARNING ACTIVITIES	MATERIALS	LEARNING OBJECTIVES
<p>INTRODUCTION (5 minutes)</p>	<p>Introduction to block printing and its connection to geometry: "We'll create geometric ornamentation using Tetra Pak and ballpens."</p>	<p>Tetra Pak, ballpens</p>	<p>Understand the basics of block printing and geometric design.</p>
<p>LEARNING ACTIVITIES (35 minutes)</p>	<p>Students create their block printing devices by carving designs into Tetra Pak using ballpens: "Carve your geometric designs into the Tetra Pak to create your block printing device."</p>		<p>Develop spatial awareness, creativity, and technical skills in block printing.</p>
<p>WRAP-UP & EVALUATION (5 minutes)</p>	<p>Discussion on the process and potential applications of their block printing devices: "Share your</p>		<p>Reflect on the creative process and interdisciplinary integration of art and math.</p>





designs and discuss how you might use them in future projects."

LESSON 6

TIME PLAN	TEACHING & LEARNING ACTIVITIES	MATERIALS	LEARNING OBJECTIVES
INTRODUCTION (5 minutes)	Recap of block printing device creation and introduction to block printing: "Today, we'll use your block printing devices to create prints, both seeing and blindfolded."	Tetra Pak printing devices, ink, paper.	Prepare for the block printing activity, emphasizing sensory exploration.
LEARNING ACTIVITIES (35 minutes)	Students create block prints using their devices, first seeing, then blindfolded with a partner guiding them: "Create your prints first with vision, then blindfolded, relying on your partner's guidance."	Tetra Pak printing devices, ink, paper, blindfolds.	Enhance sensory awareness, collaboration, and multisensory learning.
WRAP-UP & EVALUATION (5 minutes)	Compare and contrast the experiences and outcomes of seeing vs. blindfolded printing: "Discuss the differences in your experience and the prints"	Completed prints.	Reflect on sensory exploration and understanding diverse perspectives.





outcomes between seeing
and blindfolded printing."

LESSON 7

TIME PLAN	TEACHING & LEARNING ACTIVITIES	MATERIALS	LEARNING OBJECTIVES
INTRODUCTION (5 minutes)	Introduction to tactile learning and its application to understanding geometry: "We'll explore geometric problems using our sense of touch."	Various geometric shapes, blindfolds.	Introduce tactile learning and its relevance to geometry.
LEARNING ACTIVITIES (35 minutes)	Teacher-guided exploration of geometric shapes and problems, students blindfolded: "Blindfolded, explore these geometric shapes and try to solve the presented problems using your tactile sense."	Geometric shapes, blindfolds.	Develop critical thinking, problem-solving skills, and sensory awareness.
WRAP-UP & EVALUATION (5 minutes)	Discussion on the experience of tactile learning and its impact on understanding geometry: "Share your experiences and insights on how tactile learning affected	Geometric shapes	Reflect on the benefits of multisensory learning and empathy for diverse learning needs.





your understanding of
geometry."

LESSON 8

TIME PLAN	TEACHING & LEARNING ACTIVITIES	MATERIALS	LEARNING OBJECTIVES
INTRODUCTION (5 minutes)	Introduction to illustrating geometric problems through embossing and imprinting: "We'll illustrate geometric problems on paper using embossing techniques, blindfolded."	Stronger paper, rubber mats, geometric problem sets.	Understand the concept of illustrating geometric problems through tactile means.
LEARNING ACTIVITIES (35 minutes)	Reflection on the process of blindfolded illustration and tactile problem-solving: "Discuss the process and how it impacted your understanding of the geometric problems."	Embossed papers.	Reflect on the use of tactile senses in learning and the importance of empathy and inclusion in education.
WRAP-UP & EVALUATION (5 minutes)	Reflection on the process of blindfolded illustration and tactile problem-solving: "Discuss the process and how it impacted your understanding of the geometric problems."	Embossed papers.	Reflect on the use of tactile senses in learning and the importance of empathy and inclusion in education.





LESSON 9

TIME PLAN	TEACHING & LEARNING ACTIVITIES	MATERIALS	LEARNING OBJECTIVES
INTRODUCTION (10 minutes)	Documentation in a Visual Journal: "Today, we'll learn how to document our STEAM project experiences in a Visual Journal, focusing on content, layout, graphic design, and reflection."	Introduction to the importance of documentation and reflection in a Visual Journal. See the visual journal presentation in the attachments of the end of this document.	Understand the purpose and process of documenting STEAM experiences in a Visual Journal.
LEARNING ACTIVITIES (30 minutes)	Students plan how to document their work process, tasks, and STEAM experiences in the Visual Journal. They will plan how to use graphic design principles to layout their pages and illustrate their experiences and reflections on perception: "Use your Visual Journal to document your STEAM project experiences. Focus on clear layout, incorporate graphic design elements, and illustrate your reflections."	Visual Journals, pens, pencils, colored markers, examples of STEAM projects.	Develop skills in documentation, graphic design, and reflection. Enhance understanding of STEAM experiences through personal and creative expression.





<p>WRAP-UP & EVALUATION (5 minutes)</p>	<p>Students share their Visual Journal entries with the class or in small groups. They discuss their experiences, compare documentations, and provide feedback to each other: "Share your Visual Journal plan with the class. Discuss what you can learn from documenting your experiences and how it can help you reflect on your learning."</p>	<p>Visual Journals, pens, pencils, colored markers, examples of STEAM projects.</p>	<p>Foster communication and collaboration skills. Encourage reflection on learning experiences and the importance of documentation in the learning process.</p>
--	---	---	---

LESSON 10

TIME PLAN	TEACHING & LEARNING ACTIVITIES	MATERIALS	LEARNING OBJECTIVES
<p>INTRODUCTION (10 minutes)</p>	<p>Introduction to relief printing and the significance of tree rings in determining the age of trees: "Today, we'll explore how tree rings can tell the age of a tree and how we can use this texture in relief printing."</p>	<p>Tree trunk slices, cardboard, examples of relief prints.</p>	<p>Understand the concept of relief printing and the biological significance of tree rings.</p>





<p>LEARNING ACTIVITIES (30 minutes)</p>	<p>Students create relief prints using tree trunk slices and transfer these textures onto cardboard to create a layered mountain landscape. They will compare the visual and tactile experiences of arranging mountains while blindfolded and seeing: "Use the tree trunk slices to create relief prints on cardboard. Then, stack these layers to form a mountain landscape. Try arranging them both while blindfolded and seeing."</p>	<p>Tree trunk slices, cardboard, paint, rollers, blindfolds.</p>	<p>Develop an understanding of relief printing techniques, the concept of contour lines, and the representation of height in landscapes through a 3D model.</p>
<p>WRAP-UP & EVALUATION (5 minutes)</p>	<p>Discussion and reflection on the relief printing process and the comparison between blindfolded and seeing arrangements: "Reflect on your experience with relief printing and arranging landscapes. How did being blindfolded change your perception?"</p>	<p>Completed relief prints and mountain landscapes.</p>	<p>Reflect on the sensory experiences of art creation and the interpretation of tactile information.</p>

LESSON 11





TIME PLAN	TEACHING & LEARNING ACTIVITIES	MATERIALS	LEARNING OBJECTIVES
INTRODUCTION (10 minutes)	Introduction to topographic maps and the concept of contour lines: "Today, we'll learn about contour lines on maps and how they represent different elevations. We'll create our own 3D models and contour maps."	Examples of topographic maps, clay, potatoes, rulers, markers.	Understand the purpose of contour lines on maps and their significance in representing elevation.
LEARNING ACTIVITIES (30 minutes)	Students use clay to create 3D models of landscapes blindfolded. They also use potatoes, rulers, and markers to produce contour maps that match their 3D models: "Create a 3D landscape model using clay while blindfolded. Then, produce a contour map of your model using potatoes and markers."	Clay, potatoes, rulers, markers, blindfolds, workspace covers, paint smocks.	Develop skills in creating 3D models and contour maps, enhance understanding of topographic features, and practice interpreting maps.
WRAP-UP & EVALUATION (5 minutes)	Comparison of 3D models and contour maps, discussion on the accuracy and interpretation of maps: "Compare your 3D models to your contour maps. Discuss the	Completed 3D models, contour maps.	Evaluate the process of creating and interpreting contour maps, understand the importance of numerical values on contour lines, and enhance map-reading skills.





accuracy of your maps and how well they represent the model's elevation."

LESSON 12

TIME PLAN	TEACHING & LEARNING ACTIVITIES	MATERIALS	LEARNING OBJECTIVES
INTRODUCTION (10 minutes)	Discuss the concept of blind drawings and the importance of other senses in art creation. Main Instructions: "Today, we'll explore how we can use our senses other than sight to create art. You'll be drawing without seeing."	Blindfolds, paper, pencils.	Understand the concept of blind drawings and the role of sensory perception in art.
LEARNING ACTIVITIES (30 minutes)	Students create blind drawings based on verbal descriptions or tactile exploration. Main Instructions: "With your blindfold on, listen to the descriptions or feel the objects and draw what you imagine."	Blindfolds, paper, pencils, various textured objects.	Develop observational skills without sight, enhance tactile and auditory perception.





<p>WRAP-UP & EVALUATION (5 minutes)</p>	<p>Share and discuss the drawings, focusing on the experience and interpretation. Main Instructions: "Let's share your drawings and talk about what you felt and imagined during the process."</p>	<p>Completed drawings.</p>	<p>Foster imagination and creativity, encourage descriptive communication.</p>
--	--	----------------------------	--

LESSON 13

TIME PLAN	TEACHING & LEARNING ACTIVITIES	MATERIALS	LEARNING OBJECTIVES
<p>INTRODUCTION (10 minutes)</p>	<p>Introduction to sensory integration in art and the challenge of drawing without sight. Main Instructions: "We'll dive deeper into using our senses beyond sight for drawing. Focus on how each sense can contribute to your art."</p>	<p>Blindfolds, paper, pencils.</p>	<p>Enhance understanding of sensory integration in art creation</p>
<p>LEARNING ACTIVITIES (30 minutes)</p>	<p>Students participate in exercises that involve drawing while focusing on auditory or tactile inputs. Main Instructions: "Create drawings based on the</p>	<p>Blindfolds, paper, pencils, sound recordings, textured surfaces.</p>	<p>Enhance tactile and auditory perception, foster imagination and creativity.</p>





	sounds you hear or the textures you feel. Let your other senses guide your art."		
WRAP-UP & EVALUATION (5 minutes)	Reflection on the sensory drawing experience and its impact on creative expression. Main Instructions: "Reflect on how relying on other senses affects your drawing process and creativity. What did you learn about sensory perception?"	Artworks created during the lesson.	Encourage reflection on sensory exploration in art, develop empathy and inclusivity.

LESSON 14

TIME PLAN	TEACHING & LEARNING ACTIVITIES	MATERIALS	LEARNING OBJECTIVES
INTRODUCTION (10 minutes)	Introduction to geometric shapes and their properties using 3D cardboard boxes: "Today, we'll explore geometric shapes using 3D cardboard boxes. We'll discuss their properties	3D cardboard boxes (containers for glasses), geometric shape examples.	Understand geometric shapes and their properties.





	and how they can be constructed."		
LEARNING ACTIVITIES (30 minutes)	Students construct various geometric shapes using 3D cardboard boxes: "Using the cardboard boxes, construct different geometric shapes. Pay attention to the properties of each shape as you build."	3D cardboard boxes, tape, scissors.	Develop spatial reasoning and understanding of geometric principles.
WRAP-UP & EVALUATION (5 minutes)	Discussion on the constructed shapes and their properties. Materials: "Let's discuss the shapes you've constructed. What properties did you notice?"	Constructed geometric shapes:	Reflect on the construction process and geometric properties.

LESSON 15

TIME PLAN	TEACHING & LEARNING ACTIVITIES	MATERIALS	LEARNING OBJECTIVES
INTRODUCTION (10 minutes)	Introduction to the game of Jenga and the concept of balance and stability: "Today, we'll play Jenga, but with a twist – you'll be blindfolded. This will	Jenga game set	Understand balance and stability through tactile exploration.





	challenge your sense of touch and balance."		
LEARNING ACTIVITIES (30 minutes)	Students play Jenga in pairs, with one student blindfolded: "In pairs, one student will be blindfolded while playing Jenga. The other student can guide but not touch."	Jenga game set, blindfolds.	Improve problem-solving skills and teamwork through a tactile game.
WRAP-UP & EVALUATION (5 minutes)	Reflection on the experience of playing Jenga blindfolded: "Share your experience of playing Jenga blindfolded. How did it affect your strategy?"		Reflect on tactile perception and teamwork.

LESSON 16

TIME PLAN	TEACHING & LEARNING ACTIVITIES	MATERIALS	LEARNING OBJECTIVES
INTRODUCTION (5 minutes)	Introduction to constructing with LEGOs and the importance of following patterns: "We'll construct identical forms using LEGOs. Focus on the pattern and how each piece fits into the whole."	LEGO sets.	Understand patterns and symmetry through LEGO construction.





LEARNING ACTIVITIES (30 minutes)	Students attempt to construct identical LEGO forms based on a given model: "Using the LEGO sets, try to replicate the model construction as closely as possible."	LEGO sets, model constructions for reference.	Enhance spatial reasoning and understanding of symmetry.
WRAP-UP & EVALUATION (5 minutes)	Comparison of constructed forms and discussion on the challenges faced: "Compare your constructions with the model. Discuss any challenges you faced."	Constructed LEGO forms, model constructions.	Reflect on the construction process and problem-solving skills.

LESSON 17

TIME PLAN	TEACHING & LEARNING ACTIVITIES	MATERIALS	LEARNING OBJECTIVES
INTRODUCTION (10 minutes)	Introduction to constructing with LEGOs and the importance of following patterns. Main Instructions: "We'll construct identical forms using LEGOs. Focus on the pattern and how each piece fits into the whole."	LEGO sets	Understand patterns and symmetry through LEGO construction.





LEARNING ACTIVITIES (30 minutes)	Students attempt to construct identical LEGO forms based on a given model. Main Instructions: "Using the LEGO sets, try to replicate the model construction as closely as possible."	LEGO sets, model constructions for reference.	Enhance spatial reasoning and understanding of symmetry.
WRAP-UP & EVALUATION (5 minutes)	Comparison of constructed forms and discussion on the challenges faced. Main Instructions: "Compare your constructions with the model. Discuss any challenges you faced."	Constructed LEGO forms, model constructions.	Reflect on the construction process and problem-solving skills.

LESSON 18

TIME PLAN	TEACHING & LEARNING ACTIVITIES	MATERIALS	LEARNING OBJECTIVES
INTRODUCTION (10 minutes)	Introduction to polyhedrons a Main Instructions: "Today, we'll construct polyhedrons using 4Dframes, but you'll be doing it blindly to focus on the tactile properties." and their properties.	4Dframes, examples of polyhedrons.	Understand polyhedrons and their properties through tactile exploration.
LEARNING ACTIVITIES (30 minutes)	Students construct polyhedrons using	4Dframes, blindfolds.	Develop an understanding of geometric shapes and





	<p>4Dframes while blindfolded. Main Instructions: "Blindfolded, use the 4Dframes to construct polyhedrons. Focus on the tactile feedback as you connect the pieces."</p>		<p>enhance sensory exploration skills.</p>
<p>WRAP-UP & EVALUATION (5 minutes)</p>	<p>Discussion on the experience of constructing polyhedrons blindly and the importance of tactile sense in learning geometry. Main Instructions: "Reflect on your experience constructing polyhedrons blindly. How did it change your understanding of geometry?"</p>	<p>Constructed polyhedrons.</p>	<p>Reflect on sensory exploration and its impact on learning geometric concepts.</p>





EVALUATION PLAN BY LESSON

LESSON	EVALUATION CRITERIA	EVALUATION METHOD
<p>Lesson 1: Tactile Board</p> <ul style="list-style-type: none"> Evaluation Criteria: Can the student identify and utilize different textures effectively to create a tactile board? Evaluation Method: <ol style="list-style-type: none"> Tactile Sensory Evaluation: Students explore each other's tactile boards blindfolded and guess the materials used. Reflective Journal: Students write about the process of selecting and arranging materials, focusing on their decision-making and problem-solving strategies. 		
<p>Lesson 2: Completing Tactile Board</p> <ul style="list-style-type: none"> Evaluation Criteria: Did the student effectively complete the tactile board with coherent textural patterns? Evaluation Method: <ol style="list-style-type: none"> Peer Feedback: Classmates provide feedback on the creativity and effectiveness of the tactile patterns. Instructor Observation: The instructor observes and assesses the students' ability to apply sensory information in their creations. 		
<p>Lesson 3: Origami Folding</p> <ul style="list-style-type: none"> Evaluation Criteria: Is the student able to follow verbal instructions to fold origami accurately? Evaluation Method: <ol style="list-style-type: none"> Blindfolded Performance Test: Assess accuracy of the origami shapes created based solely on verbal guidance. Group Discussion: Evaluate the clarity of verbal instructions given and received among students. 		
<p>Lesson 4: Origami Folding with Audio Instructions</p> <ul style="list-style-type: none"> Evaluation Criteria: Can the student implement and follow through with audio instructions to create accurate origami structures? Evaluation Method: <ol style="list-style-type: none"> Audio Instruction Review: Students exchange recorded instructions and assess their effectiveness in guiding origami creation. Presentation: Students present their origami and discuss the challenges faced and how they overcame them. 		
<p>Lesson 5: Block Printing</p> <ul style="list-style-type: none"> Evaluation Criteria: Did the student creatively and accurately use block printing techniques to produce a geometric design? Evaluation Method: 		





1. Product Analysis: Evaluate the geometric precision and creativity of the block prints.
2. Creative Process Reflection: Students write a brief reflection on the creative process and their learning in visual journals.

Lesson 6: Using Block Print Blindfolded

- Evaluation Criteria: Can the student adapt the block printing process to work without visual cues, guided by sensory input?
- Evaluation Method:
 1. Blindfolded Printing Test: Assess the quality and accuracy of prints made blindfolded.
 2. Comparative Discussion: Students compare experiences and outcomes between sighted and blindfolded printing sessions.

Lesson 7: Tactile Geometry Problem Solving

- Evaluation Criteria: Is the student able to solve geometric problems using tactile senses alone?
- Evaluation Method:
 1. Tactile Problem Solving: Students solve tactile-based geometric puzzles and explain their thought process.
 2. Instructor Feedback: Provide feedback based on students' approaches and solutions to tactile problems.

Lesson 8: Tactile Representation of Geometric Problems

- Evaluation Criteria: Can the student effectively communicate geometric concepts through tactile means?
- Evaluation Method:
 1. Tactile Creation Review: Peers try to identify and understand the represented geometric problems through touch.
 2. Reflective Discussion: Students discuss how tactile representation changed their understanding of the geometric concepts.

Lesson 9: Documentation in Visual Journal

- Evaluation Criteria: Can the student document and reflect on their STEAM learning experiences effectively?
- Evaluation Method:
 1. Journal Inspection: Review students' visual journals for thoroughness, clarity, and reflection depth.
 2. Peer Review: Students share and critique each other's journals to provide constructive feedback.

Lesson 10: Relief Print of Tree Rings

- Evaluation Criteria: Does the student understand and apply the concepts of relief printing and topographic representation?
- Evaluation Method:
 1. Relief Print Assessment: Evaluate the technical skill and creativity in the relief prints of tree rings.





2. Sensory and Visual Comparison: Discuss the differences in perception when arranging the reliefs blindfolded versus seeing.

Lesson 11: Contour Lines and 3D Model Creation

- Evaluation Criteria: Can the student create accurate 3D models and corresponding contour maps?
- Evaluation Method:
 1. 3D Model and Map Matching: Students present their 3D clay models alongside their contour maps, and peers evaluate the accuracy and detail.
 2. Map Interpretation Test: Students explain features on their maps and relate them to the 3D models, assessing their understanding of topographic mapping.

Lesson 12: Blind Drawing

- Evaluation Criteria: Is the student able to use auditory and tactile senses to create a coherent artistic representation?
- Evaluation Method:
 1. Artistic Expression Review: Class discussion and feedback on the creativity and accuracy of the drawings based on non-visual cues.
 2. Sensory Perception Reflection: Students reflect on their experiences and the influence of sensory limitations on artistic expression.

Lesson 13: Advanced Blind Drawing

- Evaluation Criteria: Can the student enhance their sensory integration to improve their blind drawing techniques?
- Evaluation Method:
 1. Blind Drawing Gallery Walk: Students display their artwork and receive feedback based on creativity, detail, and interpretation of auditory/tactile inputs.
 2. Feedback and Improvement Discussion: Evaluate how students incorporate feedback into improving their sensory drawing skills.

Lesson 14: 3D Constructions with Cardboard

- Evaluation Criteria: Does the student understand geometric properties through constructing 3D models?
- Evaluation Method:
 1. Construction Review: Peers and instructor assess the geometric accuracy and stability of the 3D constructions.
 2. Problem-Solving and Innovation Analysis: Discussion on the strategies used and creative solutions developed during construction.

Lesson 15: Jenga Blindfolded Game

- Evaluation Criteria: Can the student navigate and manipulate 3D structures relying solely on tactile feedback?





- Evaluation Method:
 1. Jenga Performance Test: Observe and assess the student's ability to maintain balance and stability while blindfolded.
 2. Teamwork and Communication Evaluation: Review how effectively students communicate and collaborate in a tactile-only environment.

Lesson 16: LEGO Construction Challenge

- Evaluation Criteria: How well can the student replicate complex LEGO structures based on patterns and tactile feedback?
- Evaluation Method:
 1. LEGO Construction Accuracy Check: Compare constructed LEGO models to the original for precision and correctness.
 2. Creative Adaptation Discussion: Evaluate students' problem-solving strategies when encountering difficulties in replication.

Lesson 17: Advanced LEGO Construction

- Evaluation Criteria: Can the student apply advanced symmetry and pattern recognition in constructing with LEGOs?
- Evaluation Method:
 1. Symmetry and Pattern Assessment: Assess the symmetry and accuracy of the LEGO constructions against a predefined model.
 2. Reflective Peer Review: Peers provide feedback focusing on the technical and creative aspects of the constructions.

Lesson 18: Polyhedron Construction with 4Dframes

- Evaluation Criteria: Does the student demonstrate an understanding of polyhedral shapes through tactile exploration?
- Evaluation Method:
 1. Polyhedron Assembly Review: Evaluate the accuracy and complexity of the polyhedrons constructed blindfolded.
 2. Tactile and Spatial Reasoning Reflection: Students discuss how tactile feedback influenced their understanding and construction strategies.

Additional Creative Evaluation Techniques for Upper Lessons

- Interactive Demonstrations: Students demonstrate their projects in action, explaining the steps and thought processes involved.
- Design and Engineering Challenges: Provide unexpected problem scenarios where students must quickly adapt and apply their skills to solve engineering or design challenges.
- Sensory Integration Projects: Assign projects that require integrating multiple sensory inputs to achieve complex outcomes, promoting deeper understanding and creativity.
- Portfolio Review: Compile students' work throughout the course to assess overall growth and understanding.





- Group Projects: Evaluate collaborative efforts and the ability to integrate various sensory inputs in group settings.
- Creative Challenges: Set up unexpected creative tasks related to lesson content to see how students adapt and apply learned skills innovatively.

NOTES

-

ACTIVITY SHEETS TO BE LINKED

-

EVALUATION MATERIALS TO BE LINKED

-

REFERENCES / SUPPORTING MATERIALS TO BE LINKED

About the Visual Journaling method the teachers can watch the presentation by Florentine Baumann (start at 1 hour 47 min:

https://www.facebook.com/watch/live/?ref=watch_permalink&v=395482905495367)

