

Glow in the dark: design a multi-functional product

Secondary: (ages 11 – 14)

Visual arts

Students are challenged to design an accessory to be worn at a party that can also be adapted for use as bicycle lighting. The focus of this unit is an exploration of various design ideas and how they are applied, thereafter combining them into a new, multi-functional design. The formation phase for generating ideas and first design takes place individually. For the final design students may work together in pairs. The resulting product may be a 2D design, or an actual 3D prototype, depending on the available time.

Time allocation 5 lesson periods

Subject content Create and present a product that combines two functions
Develop proficiency in drawing and design techniques

Creative and critical thinking This unit has a **creativity** and **critical thinking** focus:

- Make connections between different concepts and functions to create and appraise a design
- Consider several perspectives and play with unusual ideas to produce a novel product
- Reflect on process, expressive choices, and novelty of design

Other skills Collaboration

Key words prototype; fluorescence; design; product development; sketching

Products and processes to assess

Students work individually or collaboratively to produce a design and possibly a prototype of a glow in the dark product that can both be worn/used at a party and attached to a bicycle. At the highest levels of achievement, their output is inventive and imaginative and features some risk-taking in successfully combining two functions. Their work process demonstrates a willingness to explore a variety of ideas and push them to their limits before making final choices. They are able to reflect thoughtfully and show good awareness of the strengths, limitations, and degree of originality of their final output.

Teaching and Learning plan

This plan suggests potential steps for implementing the activity. Teachers can introduce as many modifications as they see fit to adapt the activity to their teaching context.

Step	Duration	Teacher and student roles	Subject content	Creativity and critical thinking
1	Lesson period 1	Introduce assignment to class: Our school is organising a Glow in the dark dance/party. The dress code is of course Glow in the dark. Besides the party, the school wants everyone to get home safely. They are setting up a design competition for a Glow in the dark item, accessory or clothing piece, that can be worn during the party but that can also be transformed into additional lighting for a bicycle. See appendix for more details.		
2		Students spend 10 minutes writing down as many things as they can think of in 2 minutes, relating 'Glow in the dark' to parties and bicycles. There are no correct or incorrect answers. Students then sit next to each other discuss the ideas that were noted down. Which ideas are most original or new and why, which ideas are good?	Thinking rapidly about different ways of combining ideas in new applications and designs	Making novel or unusual connections between different conceptual ideas (Glow in the dark, parties, bicycles)
3		<p>Teacher shows and discusses examples of glow in the dark in nature and in art (see PowerPoint 'Introductory images from Expertise Centre'). The ideas of Vincent van Gogh and Daan Roosegaarde show that the starry sky can be a source of inspiration that leaves room to the imagination. Students may be asked to research further ways in which artists or designers have used the idea of glow in the dark.</p> <p>Students use this inspiration to generate more extensive ideas using mind maps. Students can also use the internet to explore what already exists in the line of bicycle lights and glow in the dark accessories and think about the strengths and limitations of these existing designs and how unusual or interesting they are.</p> <p>Students start to sketch out some of their initial ideas. Teacher circulates giving feedback on ideas and drawing and design techniques.</p> <p>Teacher may choose to close the lesson with a 5- minute reflection. What did you do/learn/invent in this lesson? Note this down in your log book. Depending on the time available, a few students can share what they noted.</p>	<p>Learning about specific artists and designers that have used the idea of glowing in the dark</p> <p>Researching existing art and designs that have a glow in the dark function</p> <p>Developing technical mastery of sketching techniques</p>	<p>Observing and describing relevant information</p> <p>Appraising existing designs based on aesthetic, functional, originality, and other criteria</p> <p>Generating and playing with unusual ideas and combinations to envision a creative design</p> <p>Reflecting on steps taken in creating novel or unusual designs</p>
4	Lesson period 2	Teacher briefly reminds class what they saw and did in previous lesson.		Creating visual designs that are novel and/or unusual (as appropriate to personal experience and level)

		Students select their best idea and work further on developing and finalizing this in relation to the Glow in the dark / party and bicycle assignment. At the end of this period the students hand in their sketches for assessment.	Combining two functions in one object, and visualising this by means of images and sketches	
5	Lesson period 3	<p>Teacher returns sketches to students and gives a short explanation of the end assignment and what is expected from the students. Students can choose to work together on one of the designs.</p> <p>Students decide now (or have already decided) whether they will work together with a partner or whether they will work alone. For those working together, they discuss how their designs can be fused together or which of the two designs could become a clear end design.</p> <p>Students make a clear 2D drawing/painting/description of the item for party and bicycle (A3 or A2 format). Or a clear 3D prototype of the item for party and bicycle.</p>	Working well with others to shape the idea through appropriate use of colour, form, light and texture	Reviewing alternatives, stretching and playing with ideas, and combining and Integrating perspectives to create a novel product
6	Lesson period 4	<p>Teacher reminds students of the assignment and the fact that the final design must be completed in this lesson. Students get to work. Teacher gives help and advice when this is requested and provides a sign after approx. 30 minutes for pupils to finish their work and tidy up.</p> <p>Teacher asks students to write a short assessment of their work and work process in their log book, and communicates that they will use this in the following lesson for their presentation in which they will explain their design and why it is original.</p>	Shaping idea by means of colour, form, light and texture	<p>Refining a visual arts product that meets the criteria and is novel (relative to student's experience/level)</p> <p>Reflecting on expressive choices of a visual arts piece relative to possible alternatives</p>
7	Lesson period 5	<p>Teacher explains that students are to hang or place their work in the classroom in clearly visible manner and thereafter give their classmates a short explanation about their work: What did you make and why? What were the challenges? What is original about your design?</p> <p>Students present their final work to the class. For this they make use of what they have noted in the previous lesson. The length of the presentation depends on the size of the class.</p> <p>Students give one another feedback: Each group of students writes about 1 work (a distribution of work has already been made beforehand), gives a tip for improvement, and passes this on to the students that made the work. The makers can then discuss the most important tips they have received and why they are useful</p> <p>The lesson can be closed with a reflective discussion on what students have learned and how they needed to think creatively and critically to come up with their designs.</p>	Presenting well using the language of the discipline and successfully communicating final design	Explaining strengths and limitations and reflecting on novelty of the product relative to possible alternatives

Resources and examples for inspiration

Web and print

- (Coloured) paper, cardboard, grey pencil, colouring pencils/crayons, markers, different types of chalk, charcoal, different types of paint including 'glow in the dark' paint, fluorescent paint if required, tape, glue, scissors, snap-off blades, painting utensils
- Computer or tablet or telephone (for research)
- Smart board or other screen with internet connection

Other

- Students can use their own materials brought from home

Opportunities to adapt, extend, and enrich

- Links can be made to science/engineering when asking students to produce a prototype

**Creativity and critical thinking
rubric for visual arts**

- Mapping of the different steps of the lesson plan against the OECD rubric to identify the creative and/or critical thinking skills the different parts of the lesson aim to develop

	CREATIVITY Coming up with new ideas and solutions	Steps	CRITICAL THINKING Questioning and evaluating ideas and solutions	Steps
INQUIRING	Make connections to other visual arts concepts and media or to conceptual ideas in other disciplines	2,3,4,5	Identify and question assumptions and conventional rules in a piece of visual art (content, style, technique, colour, composition, etc.)	
IMAGINING	Play with unusual and radical visual arts ideas when preparing or creating a piece of visual art	3,5	Consider several perspectives on the content, technique or expression of a piece of visual arts	5,7
DOING	Create visual art that shows expressive qualities or personally novel ways to engage a subject matter	4,6	Explain both strengths and limitations of a piece of visual arts justified by aesthetic, logical and possibly other criteria	3
REFLECTING	Reflect on steps taken in creating a piece of visual art and on its novelty compared to conventions	3,5,7	Reflect on the chosen expressive choices of a visual arts piece relative to possible alternatives	5-7

APPENDIX 1-Assignment for pupils

GLOW IN THE DARK DANCE PARTY

What you are going to do

Our school is organising a Glow in the dark dance/party. The dress code is of course Glow in the dark, in whatever form that takes. Besides the party, the school wants everyone to get home safely. They have come up with a design competition for a Glow in the dark item, accessory or clothing piece, that can be worn during the party but that can also be transformed into additional lighting for a bicycle.

What requirements does your design have to satisfy:

- Your design must be worn or used during the party.
- With some adjustments, your design must be usable as additional lighting for a bicycle.
- The design must be clear to others, for example, the school jury or a potential manufacturer
- The design should clearly indicate how it will be used during the party and how it will be attached to the bicycle. You are allowed to use text.

Material

- Available at school: (coloured) paper, cardboard, various kinds of chalk, charcoal, various kinds of paint including glow in the dark paint. tape. glue. and various utensils.

Work method

1. You start by developing an idea in your log book (individual)
2. You make a final sketch of your design (party and bicycle) on A4 drawing paper (individual)

You now decide whether you wish to work alone or together with others to develop a detailed design (see below). A group may consist of maximum 3 people.

3. You/the group makes a detailed design in 2D and/or in 3D. This design must clearly show how it is used during the party and how it is attached to the bicycle. You may use text in the design (together or individually)

