

C5- BULGARIA

STEM LESSON PLAN EVALUATION FORMS

Lesson Plan Evaluation Rating Scale

Scores	Criteria for scoring
Very good (4)	All of the elements that make up the items in each stage are available with rich details and fully, appropriately and accurately planned and implemented. Another teacher can use this plan as it is.
Good (3)	More than half of the elements that make up the items in each stage have been fully, appropriately and accurately planned and partially implemented with rich details. Another teacher can use this criterion of the plan with minor changes.
Average (2)	Approximately half of the elements that make up the items in each stage are available with some details and are fully, appropriately and correctly planned (but not implemented). Other teachers can use this criterion of the plan with changes.
Poor (1)	Less than half of the elements that make up the items in each stage are available with some details and are fully, appropriately and correctly planned (but not implemented). Other teachers should re-plan this criterion of the lesson
Not acceptable (0)	Basic elements of the lesson are not available (and are not implemented)

TOPIC: BIOMIMICRY

Country: SPAIN

	Criteria				
Preparation and Planning	4	3	2	1	0
1. The lesson plan addresses gains in the STEM disciplines.	x				
2. The lesson plan allows for sufficient time to teach the targeted gains.	x				
3. Emphasis is placed on utilizing 21st century skills.	x				
4. The lesson plan includes STEM activities for students.	x				
5. The phases of the Engineering Design Process are considered to develop new designs and outcomes.				x	
6. The lesson plan includes an introductory paragraph (scenario) that relates to a real-world problem.		x			
7. In solving the real-world problem, the possibilities and constraints in terms of time, budget and materials are considered.			x		
8. The lesson plan emphasizes different aspects of professions related to STEM professions.		x			
Applying Lesson Plan					
9. "Engage" phase: Prepare stimulants (brainstorming questions and answers, cartoons, videos, etc.) to evaluate preliminary information and stimulate curiosity.		x			
10. The "Explore" phase: Preparing activities such as hands-on activities, educational software, accessing information from printed sources, online and other experts, class discussions to identify students' existing knowledge, skills and misconceptions.		x			
11. "Explain" phase: Preparation of concepts and definitions related to the science course outcomes to finalize the STEM project.		x			
12. The "Elaborate" phase: Preparing content that reflects the gains of other STEM disciplines (technology, engineering, and Mathematics) related to the STEM activity.		x			
13. "Evaluation" phase: Using a measurement and assessment approach to STEM instruction.		x			
Course Outcomes (Assessment of Design)					
14. Students use their knowledge and skills to produce a unique and durable product that provides solutions to real-world problems.	x				

Explanations

In the plan;

- Technological Process method was used as a design process.
- Engineering problem was defined briefly.
- Content flow is good.
- Biomimicry: The students were wanted to be inspired from the nature or living things.
- Constraints and criteria were seen in the lesson plan under the title of "Constraints and Criteria".

Country: SLOVAKIA

	Criteria				
	4	3	2	1	0
Preparation and Planning					
1. The lesson plan addresses gains in the STEM disciplines.	x				
2. The lesson plan allows for sufficient time to teach the targeted gains.	x				
3. Emphasis is placed on utilizing 21st century skills.		x			
4. The lesson plan includes STEM activities for students.	x				
5. The phases of the Engineering Design Process are considered to develop new designs and outcomes.			x		
6. The lesson plan includes an introductory paragraph (scenario) that relates to a real-world problem.		x			
7. In solving the real-world problem, the possibilities and constraints in terms of time, budget and materials are considered.	x				
8. The lesson plan emphasizes different aspects of professions related to STEM professions.	x				
Applying Lesson Plan					
9. "Engage" phase: Prepare stimulants (brainstorming questions and answers, cartoons, videos, etc.) to evaluate preliminary information and stimulate curiosity.		x			
10. The "Explore" phase: Preparing activities such as hands-on activities, educational software, accessing information from printed sources, online and other experts, class discussions to identify students' existing knowledge, skills and misconceptions.		x			
11. "Explain" phase: Preparation of concepts and definitions related to the science course outcomes to finalize the STEM project.		x			
12. The "Elaborate" phase: Preparing content that reflects the gains of other STEM disciplines (technology, engineering, and Mathematics) related to the STEM activity.		x			
13. "Evaluation" phase: Using a measurement and assessment approach to STEM instruction.		x			
Course Outcomes (Assessment of Design)					
14. Students use their knowledge and skills to produce a unique and durable product that provides solutions to real-world problems.	x				
Explanations • Engineering design process is used in the lesson plan. • Engineering problem was defined briefly. • Content flow is good. • Constraints and criteria are presented in the introduction of Engineering Problem. They can be detailed more and presented under the title of "Constraints and Criteria". • For the Bulgaria mobility, the main theme of the lesson plans was using biomimicry in our lesson plans. That's why, we need to integrate biomimicry into the lesson plan clearly. • For example, bridges need to be built by using the functions of living things or they must be inspired from the nature in these stages. • However, the bridge examples (Beam bridge, Truss bridge, Cantilever bridge, Arch bridge, Suspension bridge) that students can inspire from are the human-made structures. In short, while designing the bridges students should inspire from the adaptations or characteristics of living things or nature. Like that, it is difficult to understand how biomimicry is used in designing the proposed bridges.					

Country: POLAND

	Criteria				
Preparation and Planning	4	3	2	1	0
1. The lesson plan addresses gains in the STEM disciplines.	x				
2. The lesson plan allows for sufficient time to teach the targeted gains.	x				
3. Emphasis is placed on utilizing 21st century skills.	x				
4. The lesson plan includes STEM activities for students.	x				
5. The phases of the Engineering Design Process are considered to develop new designs and outcomes.	x				
6. The lesson plan includes an introductory paragraph (scenario) that relates to a real-world problem.	x				
7. In solving the real-world problem, the possibilities and constraints in terms of time, budget and materials are considered.	x				
8. The lesson plan emphasizes different aspects of professions related to STEM professions.	x				
Applying Lesson Plan					
9. "Engage" phase: Prepare stimulants (brainstorming questions and answers, cartoons, videos, etc.) to evaluate preliminary information and stimulate curiosity.	x				
10. The "Explore" phase: Preparing activities such as hands-on activities, educational software, accessing information from printed sources, online and other experts, class discussions to identify students' existing knowledge, skills and misconceptions.	x				
11. "Explain" phase: Preparation of concepts and definitions related to the science course outcomes to finalize the STEM project.	x				
12. The "Elaborate" phase: Preparing content that reflects the gains of other STEM disciplines (technology, engineering, and Mathematics) related to the STEM activity.	x				
13. "Evaluation" phase: Using a measurement and assessment approach to STEM instruction.	x				
Course Outcomes (Assessment of Design)					
14. Students use their knowledge and skills to produce a unique and durable product that provides solutions to real-world problems.	x				
Explanations In the plan; • 5E Engineering design process is used. • Engineering problem was defined briefly. • Biomimicry is used. The students were wanted to be inspired from the nature or living things. • Content flow is good. • The constraints and criteria can be detailed more.					

Country: LITHUANIA

	Criteria				
Preparation and Planning	4	3	2	1	0
1. The lesson plan addresses gains in the STEM disciplines.		x			
2. The lesson plan allows for sufficient time to teach the targeted gains.			x		
3. Emphasis is placed on utilizing 21st century skills.			x		
4. The lesson plan includes STEM activities for students.			x		
5. The phases of the Engineering Design Process are considered to develop new designs and outcomes.			x		
6. The lesson plan includes an introductory paragraph (scenario) that relates to a real-world problem.			x		
7. In solving the real-world problem, the possibilities and constraints in terms of time, budget and materials are considered.			x		
8. The lesson plan emphasizes different aspects of professions related to STEM professions.			x		
Applying Lesson Plan					
9. "Engage" phase: Prepare stimulants (brainstorming questions and answers, cartoons, videos, etc.) to evaluate preliminary information and stimulate curiosity.			x		
10. The "Explore" phase: Preparing activities such as hands-on activities, educational software, accessing information from printed sources, online and other experts, class discussions to identify students' existing knowledge, skills and misconceptions.			x		
11. "Explain" phase: Preparation of concepts and definitions related to the science course outcomes to finalize the STEM project.			x		
12. The "Elaborate" phase: Preparing content that reflects the gains of other STEM disciplines (technology, engineering, and Mathematics) related to the STEM activity.			x		
13. "Evaluation" phase: Using a measurement and assessment approach to STEM instruction.			x		
Course Outcomes (Assessment of Design)					
14. Students use their knowledge and skills to produce a unique and durable product that provides solutions to real-world problems.			x		
Explanations In the plan; • Real-life problems or human needs were not clearly defined. • The activity steps did not align coherently with the engineering design process. • The roles of disciplines in solving the problem were not clearly identified. • Criteria and constraints were either missing or not placed in the correct section. • There was a lack of awareness about STEM careers. Therefore, creating an evaluation rubric for students to self-assess their STEM career awareness would be beneficial.					

Country: BULGARIA

	Criteria				
Preparation and Planning	4	3	2	1	0
1. The lesson plan addresses gains in the STEM disciplines.		x			
2. The lesson plan allows for sufficient time to teach the targeted gains.			x		
3. Emphasis is placed on utilizing 21st century skills.			x		
4. The lesson plan includes STEM activities for students.			x		
5. The phases of the Engineering Design Process are considered to develop new designs and outcomes.			x		
6. The lesson plan includes an introductory paragraph (scenario) that relates to a real-world problem.			x		
7. In solving the real-world problem, the possibilities and constraints in terms of time, budget and materials are considered.			x		
8. The lesson plan emphasizes different aspects of professions related to STEM professions.			x		
Applying Lesson Plan					
9. "Engage" phase: Prepare stimulants (brainstorming questions and answers, cartoons, videos, etc.) to evaluate preliminary information and stimulate curiosity.		x			
10. The "Explore" phase: Preparing activities such as hands-on activities, educational software, accessing information from printed sources, online and other experts, class discussions to identify students' existing knowledge, skills and misconceptions.			x		
11. "Explain" phase: Preparation of concepts and definitions related to the science course outcomes to finalize the STEM project.			x		
12. The "Elaborate" phase: Preparing content that reflects the gains of other STEM disciplines (technology, engineering, and Mathematics) related to the STEM activity.			x		
13. "Evaluation" phase: Using a measurement and assessment approach to STEM instruction.			x		
Course Outcomes (Assessment of Design)					
14. Students use their knowledge and skills to produce a unique and durable product that provides solutions to real-world problems.			x		
Explanations - The plan failed to define real-life problems or human needs clearly. - The activity steps lacked coherence with the engineering design process. - The roles of disciplines in problem-solving were not clearly identified. - Criteria and constraints were either missing or improperly placed. - There was a lack of awareness regarding STEM careers. Therefore, creating an evaluation rubric for students to assess their own STEM career awareness would be beneficial.					

Country: TURKIYE

	Criteria				
Preparation and Planning	4	3	2	1	0
1. The lesson plan addresses gains in the STEM disciplines.	x				
2. The lesson plan allows for sufficient time to teach the targeted gains.		x			
3. Emphasis is placed on utilizing 21st century skills.	x				
4. The lesson plan includes STEM activities for students.		x			
5. The phases of the Engineering Design Process are considered to develop new designs and outcomes.	x				
6. The lesson plan includes an introductory paragraph (scenario) that relates to a real-world problem.		x			
7. In solving the real-world problem, the possibilities and constraints in terms of time, budget and materials are considered.	x				
8. The lesson plan emphasizes different aspects of professions related to STEM professions.		x			
Applying Lesson Plan					
9. "Engage" phase: Prepare stimulants (brainstorming questions and answers, cartoons, videos, etc.) to evaluate preliminary information and stimulate curiosity.	x				
10. The "Explore" phase: Preparing activities such as hands-on activities, educational software, accessing information from printed sources, online and other experts, class discussions to identify students' existing knowledge, skills and misconceptions.	x				
11. "Explain" phase: Preparation of concepts and definitions related to the science course outcomes to finalize the STEM project.	x				
12. The "Elaborate" phase: Preparing content that reflects the gains of other STEM disciplines (technology, engineering, and Mathematics) related to the STEM activity.	x				
13. "Evaluation" phase: Using a measurement and assessment approach to STEM instruction.	x				
Course Outcomes (Assessment of Design)					
14. Students use their knowledge and skills to produce a unique and durable product that provides solutions to real-world problems.	x				
Explanations In the plan; • The problem situation is good. • Engineering Design Process well defined • Awareness about STEM careers is clear. • The criteria and constraints are clearly defined. • Content flow is good. The lesson plan is generally good.					