

## **C8- POLAND**

# **STEM LESSON PLAN EVALUATION FORMS**

### **Lesson Plan Evaluation Rating Scale**

| <b>Scores</b>      | <b>Criteria for scoring</b>                                                                                                                                                                                                                       |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 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: CLIMATE CHANGE

**Country: SPAIN**

|                                                                                                                                                                                                                                                               | Criteria |          |          |          |          |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|----------|----------|----------|----------|
| <b>Preparation and Planning</b>                                                                                                                                                                                                                               | <b>4</b> | <b>3</b> | <b>2</b> | <b>1</b> | <b>0</b> |
| 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        |          |          |          |          |
| <b>Applying Lesson Plan</b>                                                                                                                                                                                                                                   |          |          |          |          |          |
| 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        |          |          |          |          |
| <b>Course Outcomes (Assessment of Design)</b>                                                                                                                                                                                                                 |          |          |          |          |          |
| 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.
- Awareness about STEM careers is clear.
- The criteria and constraints are not clearly defined.
- The steps of the activity were not coherent to the engineering design steps.
- Content flow is good.

The lesson plan is generally good.

**Country: SLOVAKIA**

|                                                                                                                                                                                                                                                                                                                | <b>Criteria</b> |          |          |          |          |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|----------|----------|----------|----------|
| <b>Preparation and Planning</b>                                                                                                                                                                                                                                                                                | <b>4</b>        | <b>3</b> | <b>2</b> | <b>1</b> | <b>0</b> |
| 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               |          |          |          |          |
| <b>Applying Lesson Plan</b>                                                                                                                                                                                                                                                                                    |                 |          |          |          |          |
| 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               |          |          |          |          |
| <b>Course Outcomes (Assessment of Design)</b>                                                                                                                                                                                                                                                                  |                 |          |          |          |          |
| 14. Students use their knowledge and skills to produce a unique and durable product that provides solutions to real-world problems.                                                                                                                                                                            | x               |          |          |          |          |
| <b>Explanations:</b><br><br>In the plan; <ul style="list-style-type: none"> <li>• The problem situation is good,</li> <li>• Awareness about STEM careers is clear.</li> <li>• The criteria and constraints are clearly defined.</li> <li>• Content flow is good.</li> </ul> The lesson plan is generally good. |                 |          |          |          |          |

**Country: POLAND**

|                                                                                                                                                                                                                                                                                                                                                                                                   | <b>Criteria</b> |          |          |          |          |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|----------|----------|----------|----------|
| <b>Preparation and Planning</b>                                                                                                                                                                                                                                                                                                                                                                   | <b>4</b>        | <b>3</b> | <b>2</b> | <b>1</b> | <b>0</b> |
| 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               |          |          |          |          |
| <b>Applying Lesson Plan</b>                                                                                                                                                                                                                                                                                                                                                                       |                 |          |          |          |          |
| 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               |          |          |          |          |
| <b>Course Outcomes (Assessment of Design)</b>                                                                                                                                                                                                                                                                                                                                                     |                 |          |          |          |          |
| 14. Students use their knowledge and skills to produce a unique and durable product that provides solutions to real-world problems.                                                                                                                                                                                                                                                               | x               |          |          |          |          |
| <b>Explanations</b><br>In the plan; <ul style="list-style-type: none"> <li>• 5E Engineering design process is used.</li> <li>• Engineering problem was defined briefly.</li> <li>• Content flow is good.</li> <li>• The constraints and criteria can be detailed more.</li> <li>• The plan effectively addresses real-life problems or human needs.</li> </ul> The lesson plan is generally good. |                 |          |          |          |          |

**Country: LITHUANIA**

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Criteria |          |          |          |          |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|----------|----------|----------|----------|
| <b>Preparation and Planning</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <b>4</b> | <b>3</b> | <b>2</b> | <b>1</b> | <b>0</b> |
| 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        |          |          |
| <b>Applying Lesson Plan</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |          |          |          |          |          |
| 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        |          |          |
| <b>Course Outcomes (Assessment of Design)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |          |          |          |          |          |
| 14. Students use their knowledge and skills to produce a unique and durable product that provides solutions to real-world problems.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |          |          | x        |          |          |
| <p><b>Explanations</b></p> <ul style="list-style-type: none"> <li>The plan did not clearly address real-life problems or human needs.</li> <li>The activity steps lacked coherence with the typical engineering design process.</li> <li>The roles of disciplines in solving the problem were not clearly specified.</li> <li>Criteria and constraints were not included in the plan.</li> <li>The plan lacked awareness of STEM careers. Therefore, creating an evaluation rubric for students to assess their own STEM career awareness would be beneficial.</li> </ul> <p>The lesson plan is generally good.</p> |          |          |          |          |          |

**Country: BULGARIA**

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Criteria |   |   |   |   |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|---|---|---|---|
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 4        | 3 | 2 | 1 | 0 |
| <b>Preparation and Planning</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |          |   |   |   |   |
| 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 |   |   |
| <b>Applying Lesson Plan</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |          |   |   |   |   |
| 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 |   |   |   |
| <b>Course Outcomes (Assessment of Design)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |          |   |   |   |   |
| 14. Students use their knowledge and skills to produce a unique and durable product that provides solutions to real-world problems.                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | x        |   |   |   |   |
| <b>Explanations</b> <ul style="list-style-type: none"> <li>Real-life problems or human needs were not clearly addressed in the plan.</li> <li>The activity steps were not coherent with the typical engineering design process.</li> <li>The roles of disciplines in solving the problem were not clearly specified.</li> <li>Criteria and constraints were not included in the plan.</li> <li>The plan lacked awareness of STEM careers, suggesting the need for an evaluation rubric for students to assess their own STEM career awareness.</li> </ul> <p>The lesson plan is generally good.</p> |          |   |   |   |   |

**Country: TURKIYE**

|                                                                                                                                                                                                                                                                                                                                                                                      | Criteria |          |          |          |          |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|----------|----------|----------|----------|
| <b>Preparation and Planning</b>                                                                                                                                                                                                                                                                                                                                                      | <b>4</b> | <b>3</b> | <b>2</b> | <b>1</b> | <b>0</b> |
| 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        |          |          |          |          |
| <b>Applying Lesson Plan</b>                                                                                                                                                                                                                                                                                                                                                          |          |          |          |          |          |
| 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        |          |          |          |          |
| <b>Course Outcomes (Assessment of Design)</b>                                                                                                                                                                                                                                                                                                                                        |          |          |          |          |          |
| 14. Students use their knowledge and skills to produce a unique and durable product that provides solutions to real-world problems.                                                                                                                                                                                                                                                  | x        |          |          |          |          |
| <p><b>Explanations:</b><br/>           In the plan;<br/>           • The problem situation is good.<br/>           • Engineering Design Process well defined<br/>           • Awareness about STEM careers is clear.<br/>           • The criteria and constraints are clearly defined.<br/>           • Content flow is good.<br/>           The lesson plan is generally good.</p> |          |          |          |          |          |