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| ACTIVITY PLAN | | | | |
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| **Theme** | **Subtopic** | **Activity Title** |
| STEAM Integration in Environmental Education | Technology for Environmental Solutions | Developing Technology-Driven Environmental Solutions |

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| Introduction part (or activity overview) |
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| **Introduction part (or activity overview)** | This activity involves students in creating and implementing technology-driven solutions to address specific environmental challenges. The focus is on utilizing modern technologies such as sensors, drones, and software applications to develop innovative and practical solutions. The activity aims to develop technical skills, creativity, and a deep understanding of how technology can be applied to environmental issues. |
| **SETTING** | Location: Classroom for planning and development, outdoor or lab environment for testing.  Educational Context: Collaborative group work. |

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| Materials Needed |
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| **Materials Needed** | Research materials (books, articles, internet access)  Technology tools (sensors, drones, software applications, coding platforms)  Prototyping materials (hardware kits, 3D printers, craft supplies)  Presentation tools (e.g., PowerPoint, poster boards)  Whiteboard and markers |

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| **Learning Outcomes** | * Develop skills in utilizing technology to solve environmental problems. * Enhance understanding of the intersection between technology and environmental science. * Improve abilities in project planning, technical implementation, and presentation. |  |
| **Activity Contents** | **Theoretical Part (Duration: 60 minutes)**: Begin with a detailed introduction to the role of technology in environmental solutions and its potential impacts.   * **Introduction to Technology-Driven Environmental Solutions**:   + Discuss the various ways technology can be used to address environmental challenges. Highlight examples such as remote sensing for monitoring deforestation, drones for wildlife conservation, and software applications for environmental data analysis.     - Explain the importance of integrating technology with environmental science to develop efficient and scalable solutions.   + **Case Studies of Successful Technology-Driven Solutions**:     - Discuss how satellite imagery and remote sensing technologies are used to monitor and combat deforestation in real-time. Highlight the economic and environmental benefits of timely data and intervention.     - Explain how drones are being utilized to monitor wildlife populations, track poachers, and manage protected areas. Discuss the impact of these technologies on conservation efforts and biodiversity.     - Explore how software applications are used to collect, analyze, and visualize environmental data, aiding in decision-making and policy development.   + **Key Technologies and Tools**:     - Overview of how sensors and Internet of Things (IoT) devices can be deployed to monitor environmental parameters such as air and water quality, soil moisture, and climate conditions.     - Explanation of drone technology and its applications in environmental monitoring, mapping, and data collection.     - Introduction to software tools and coding platforms that can be used to analyze environmental data and develop solutions. * **Video Resources**:   + "Technology in Environmental Solutions" https://www.youtube.com/watch?v=6TmSqBz4esU   + "Using Drones for Environmental Monitoring" https://www.youtube.com/watch?v=V-3gzAxpp18   **Discussion Prompts**:   * How can technology enhance our ability to monitor and address environmental issues? * What are the potential challenges in implementing technology-driven environmental solutions? * How can we ensure that technological solutions are accessible and scalable?   **Task 1: Technology Research and Selection (Duration: 90 minutes)** **Objective**: To research and select appropriate technologies for addressing specific environmental challenges.  **Steps**:   1. Divide students into groups, each assigned a different environmental challenge to address using technology. 2. Use provided materials to research various technologies and tools that can be applied to the assigned challenge. Consider factors such as cost, scalability, and ease of use. 3. Select the most suitable technology or combination of technologies for the project. Justify the selection based on the research conducted.   **Task 2: Project Development and Prototyping (Duration: 120 minutes)** **Objective**: To develop and prototype technology-driven solutions for the assigned environmental challenges.  **Steps**:   1. Create a detailed project plan that outlines the objectives, methodology, and timeline for developing the solution. 2. Use the selected technologies to develop prototypes of the solutions. This may involve coding, building hardware, or creating software applications. 3. Test the prototypes in a controlled environment or field setting. Collect data on performance and make necessary refinements to improve effectiveness.   **Task 3: Presentation and Demonstration (Duration: 60 minutes)** **Objective**: To present and demonstrate the developed solutions and receive feedback.  **Steps**:   1. Each group creates a presentation that showcases their project, including the problem addressed, technology used, development process, and results. Use visual aids such as slides, videos, or live demonstrations. 2. Present the projects to the class, demonstrating how the solutions work and discussing their potential impacts. 3. Engage in a Q&A session where peers and instructors provide feedback and ask questions. Discuss potential improvements based on the feedback received. |  |
| **Assessments** | Appropriateness and effectiveness of the selected technology.  Quality and functionality of the prototypes developed.  Clarity and persuasiveness of the presentation and demonstration.  Ability to defend solutions during the Q&A session.  Team collaboration and participation. |  |
| **Key Competences** | Technical skills in using and developing technology  Research and problem-solving skills  Project planning and management  Effective communication and presentation skills  Teamwork and collaboration |  |
| **Connections with Eco STEAM** | Eco: Using technology to develop practical solutions for environmental challenges.  Science: Applying scientific principles to design and test solutions.  Technology: Utilizing and developing technological tools and applications.  Engineering: Creating and refining prototypes to address real-world problems.  Arts: Creatively presenting solutions and demonstrating their impact.  Math: Analyzing data collected during testing and evaluating the effectiveness of solutions. |  |
| **References** | https://www.applus.com/global/en/news/environmental-monitoring-systems:-technology-at-the-service-of-business,-environment,-and-society |  |
| **Notes** | This activity can be extended into a longer-term project, where students further develop and implement their solutions in real-world settings.  Encourage students to engage with local environmental organizations or technology experts for real-world insights and support. |  |

**Evaluation Criteria Table for Developing Technology-Driven Environmental Solutions**

| **Evaluation Criteria** | **Points Available** | **Comments** |
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| **1. Appropriateness and Effectiveness of Selected Technology** | 20 | Assess the suitability and effectiveness of the chosen technology for addressing the assigned environmental challenge. |
| **2. Quality and Functionality of Prototypes Developed** | 20 | Evaluate the quality, functionality, and innovation demonstrated in the developed prototypes. |
| **3. Clarity and Persuasiveness of Presentation and Demonstration** | 20 | Rate the clarity, persuasiveness, and engagement level of the presentation and demonstration given by each group. |
| **4. Ability to Defend Solutions During Q&A Session** | 20 | Assess the quality and relevance of responses during the Q&A session and the ability to defend the solutions. |
| **5. Team Collaboration and Participation** | 20 | Evaluate the level of teamwork, communication, and participation among group members throughout the activity. |

**Total Points:** 100