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| ACTIVITY PLAN | | | | |
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| **Theme** | **Subtopic** | **Activity Title** |
| Collaboration and Communication in EcoSTEAM Projects | Cross-disciplinary Collaboration for Sustainable Solutions | Collaborative Innovation for Sustainable Development |

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| Introduction part (or activity overview) |
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| **Introduction part (or activity overview)** | This activity involves students collaborating across different disciplines to develop sustainable solutions to environmental challenges. By leveraging diverse skills and perspectives, students will create innovative and practical solutions that address real-world problems. The focus is on teamwork, communication, and integrating knowledge from various STEAM fields. |
| **SETTING** | Location: Classroom for planning and discussion, online resources for research, and lab or field environment for implementation.  Educational Context: Collaborative group work. |

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| Materials Needed |
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| **Materials Needed** | Research materials (books, articles, internet access)  Project planning tools (whiteboard, markers, project management software)  Prototyping materials (craft supplies, recycled materials, basic tools)  Presentation tools (e.g., PowerPoint, poster boards)  Communication tools (video conferencing software, messaging apps) |

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| **Learning Outcomes** | * Develop skills in cross-disciplinary collaboration and teamwork. * Enhance understanding of the role of different disciplines in addressing environmental issues. * Improve abilities in project planning, implementation, and presentation. |  |
| **Activity Contents** | **Theoretical Part (Duration: 60 minutes)**: Provide a detailed introduction to the importance of cross-disciplinary collaboration for sustainable solutions and how different disciplines can contribute.   * **Introduction to Cross-Disciplinary Collaboration**:   Cross-disciplinary collaboration involves integrating knowledge and expertise from different fields to tackle complex problems. In the context of environmental challenges, this approach allows for more comprehensive and effective solutions. By combining insights from science, technology, engineering, arts, and mathematics (STEAM), students can address environmental issues from multiple angles and create innovative solutions.  Consider the development of a green building. Architects, engineers, environmental scientists, and urban planners must work together to design a building that is not only structurally sound and aesthetically pleasing but also energy-efficient and environmentally friendly.   * + **Case Studies of Successful Cross-Disciplinary Projects**:     - **Green Building Design**: Green buildings incorporate sustainable materials, energy-efficient systems, and innovative design principles to reduce their environmental impact. For example, the Bullitt Center in Seattle is a collaboration between architects, engineers, and environmental scientists to create one of the greenest commercial buildings in the world. It features solar panels, rainwater harvesting, and composting toilets.     - **Renewable Energy Projects**: Developing renewable energy sources such as wind farms and solar power plants requires collaboration between engineers, environmental scientists, economists, and policymakers. For instance, the Gansu Wind Farm in China, one of the largest wind farms globally, involved extensive planning and cooperation between various disciplines to ensure its success.     - **Conservation Initiatives**: Effective conservation strategies often require input from biologists, geographers, sociologists, and local communities. The Yellowstone to Yukon Conservation Initiative is an example where scientists, policymakers, and indigenous communities work together to protect biodiversity and promote sustainable development across a vast region.   + **Key Skills for Effective Collaboration**:     - Clear and open communication is vital for successful collaboration. It involves active listening, expressing ideas clearly, and providing constructive feedback. Teams should establish regular communication channels and meetings to ensure everyone is on the same page.     - Effective project management helps teams plan, execute, and monitor their projects. It involves setting clear objectives, defining roles and responsibilities, creating timelines, and using project management tools like Gantt charts or Trello boards to track progress.     - Critical thinking involves analyzing problems objectively, evaluating different solutions, and making informed decisions. Problem-solving skills enable teams to overcome challenges and adapt to changing circumstances. * **Video Resources**:   + " Cross-disciplinary collaborations mean better solutions " https://www.youtube.com/watch?v=UCySbuxZRcE   **Discussion Prompts**:   * How can different disciplines contribute to solving environmental issues? * What are the key challenges in cross-disciplinary collaboration, and how can they be addressed? * How can effective communication and project management enhance collaboration?   **Task 1: Project Ideation and Planning (Duration: 90 minutes)**  **Steps**:   1. Divide students into teams, ensuring that each team includes members from different disciplines (e.g., science, technology, engineering, arts, mathematics). 2. Conduct a brainstorming session to generate project ideas that leverage the diverse skills and perspectives of the team members. Use mind maps or idea boards to visualize concepts. 3. Create a detailed project plan that outlines the objectives, methodology, timeline, and roles and responsibilities of each team member. Use project management tools to organize tasks and monitor progress.   **Task 2: Project Development and Implementation (Duration: 120 minutes)** **Steps**:   1. Use provided materials to research the environmental challenge and gather relevant data. Collaborate with team members to analyze the data and develop innovative solutions. 2. Use the knowledge and skills from different disciplines to develop prototypes or solutions. This may involve coding, building hardware, designing visuals, or conducting experiments. 3. Test the prototypes or solutions in a controlled environment or field setting. Collect data on performance and make necessary refinements to improve effectiveness   **Task 3: Presentation and Feedback (Duration: 60 minutes)** **Steps**:   1. Each team creates a presentation that showcases their project, including the problem addressed, interdisciplinary approach, development process, and results. Use visual aids such as slides, videos, or live demonstrations. 2. Present the projects to the class, highlighting the contributions of each discipline and the overall impact of the solution. 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** | Effectiveness of cross-disciplinary collaboration and integration of knowledge.  Quality and innovation of the developed solutions.  Clarity and persuasiveness of the presentation.  Ability to defend solutions during the Q&A session.  Team collaboration and participation. |  |
| **Key Competences** | Cross-disciplinary collaboration and teamwork  Research and problem-solving skills  Project planning and management  Effective communication and presentation skills  Critical thinking and innovation |  |
| **Connections with Eco STEAM** | Eco: Developing sustainable solutions through interdisciplinary collaboration.  Science: Applying scientific principles to environmental challenges.  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.mdpi.com/2071-1050/12/4/1515> - Cross-Disciplinary Collaboration in Sustainability |  |
| **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 experts from different disciplines for real-world insights and support. |  |

**Evaluation Criteria Table for Collaborative Innovation for Sustainable Development**

| **Evaluation Criteria** | **Points Available** | **Comments** |
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| **1. Effectiveness of Cross-Disciplinary Collaboration and Integration of Knowledge** | 20 | Assess how well the team integrated knowledge and skills from different disciplines to develop the solution. |
| **2. Quality and Innovation of the Developed Solutions** | 20 | Evaluate the quality, functionality, and innovation demonstrated in the developed solutions. |
| **3. Clarity and Persuasiveness of the Presentation** | 20 | Rate the clarity, persuasiveness, and engagement level of the presentation given by each team. |
| **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 team members throughout the activity. |

**Total Points:** 100