"Digital Innovations for Water, Land, and Food Stewardship in Cibecue (Apache Innovations for Our Future)"

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Acknowledgement

This curriculum unit, titled "Digital Innovations for Water, Land, and Food Stewardship in Cibecue," is designed to engage high school computer science students in meaningful, real-world problem-solving. At its core, the unit challenges students to identify critical issues within the Cibecue Apache community related to environmental sustainability—specifically concerning water and land management, as well as food security. Leveraging the popular platform Minecraft Education Edition, students will collaboratively design digital prototypes of machines, robots, or AI-powered technologies that propose innovative solutions to these challenges. This approach builds upon the success of previous project-based learning initiatives, such as the "Elm Trees Exterminator" project, by allowing students to apply their burgeoning technological skills to tangible community needs. The selection of Minecraft and AI application aligns with current technological trends, ensuring students develop relevant and future-ready skills.

The "who" of this curriculum unit encompasses high school computer science students, typically ranging from Grades 9–12. The unit is flexible enough to be adapted for either introductory or more advanced computer science courses, depending on the depth of technical expectation and the complexity of the problems chosen. Content areas intrinsically woven into this unit include Computer Science/Technology, Environmental Science (with a focus on water ecology, land stewardship, and biodiversity), Social Studies (exploring Apache history, culture, and environmental justice), Design Thinking, and English Language Arts (through emphasis on communication and advocacy).

Crucially, this unit is situated within the context of a classroom in Flagstaff, Arizona, yet it intentionally bridges this geographical distance by focusing on the unique challenges and rich

cultural heritage of the Cibecue Apache community. As a high school computer teacher, and having previously served as a high school special education transition teacher, my aim is to cultivate an inclusive and supportive learning environment. This ensures that every student, regardless of their diverse learning styles or previous academic support needs, discovers avenues to contribute their distinct 'genius' through culturally relevant problem-solving. The unit is particularly significant for students of Apache heritage, providing them a direct and empowering pathway to intertwine their computer science acumen with their cultural identity and ancestral lands. For all students, this unit is designed to foster profound respect, empathy, and understanding of Indigenous knowledge systems and community resilience. Collaborative teamwork is a foundational element, and I will implement varied tools and scaffolds to guarantee that every student's voice is heard and every skill level is valued, ultimately fostering 'joy' through their meaningful contributions to a specific and vital community.

In terms of teaching schedule integration, "Digital Innovations for Sustainable Futures" is conceived as a substantial project-based learning (PBL) unit, ideally spanning 6–8 weeks, or even a full quarter. This generous timeframe is essential to allow for deep research into Cibecue’s distinct challenges, iterative design processes, and significant project development within Minecraft. It is envisioned as a powerful capstone project for a computer science course, or as an impactful interdisciplinary collaboration with social studies or environmental science classes that delve into Indigenous studies, water resources, land management, food systems, or environmental justice. The unit's implementation between August and October strategically leads into the INE Showcase on November 8th, providing a culminating event for students to present their innovative solutions to an authentic audience.

Rationale

The "why" behind the creation of the "Digital Innovations for Sustainable Futures" curriculum unit is deeply rooted in my philosophy of education: to create learning experiences that are not only academically rigorous but also profoundly relevant, culturally affirming, and empowering. As a high school computer teacher, I believe in moving beyond theoretical concepts to practical applications, especially when those applications can directly benefit communities and address pressing global challenges.

I selected this particular topic—water, land, and food stewardship in the context of the Cibecue Apache community—for several compelling reasons. Firstly, these are universal issues, yet they manifest with unique complexities in different geographical and cultural contexts. By focusing on Cibecue, we are engaging with specific, localized problems that demand thoughtful, community-informed solutions. This immediately elevates the learning from abstract concepts to tangible, impactful endeavors. Secondly, the integration of technology, specifically Minecraft Education Edition and AI tools, provides a highly engaging and accessible platform for students to explore complex ideas. Minecraft, often perceived as a game, transforms into a powerful design and prototyping environment where students can visualize and test their solutions in a virtual space. The opportunity to design machines, robots, or AI concepts within this familiar digital sandbox drastically lowers the intimidation factor for technology use, particularly for Indigenous students who may sometimes feel disconnected from mainstream tech narratives. This directly aligns with the idea of making technology a bridge to cultural engagement rather than a barrier.

Furthermore, this unit is profoundly meaningful for my grade level and content area. Computer science is not merely about coding; it's about computational thinking, problem-solving, and understanding the societal implications of technology. This unit provides an authentic context for students to apply these principles. They will engage in decomposition (breaking down large problems), pattern recognition (identifying trends in environmental data), abstraction (modeling real-world systems in Minecraft), and algorithm design (planning how their digital machines or AI would operate). This hands-on application solidifies their understanding of computer science fundamentals in a way that traditional lectures cannot.

The unit's ability to make relevant connections to my students' cultures, families, communities, and histories is paramount. It explicitly encourages students to research Apache Traditional Ecological Knowledge (TEK) related to water, land, and traditional food systems. This is a deliberate counter-narrative to often-Eurocentric educational approaches, validating Indigenous ways of knowing and demonstrating that profound wisdom for sustainable living exists within these historical and living traditions. This emphasis ensures that Indigenous students see their heritage not just acknowledged but actively valued as a source of 'genius' and innovative solutions. It helps to combat the pervasive issue of knowledge getting lost – for example, understanding fundamental concepts like "what is a seed?" beyond a textbook definition, by exploring its cultural significance and practical application in sustainable food systems. For all students, this fosters cultural humility and appreciation for diverse knowledge systems, building bridges of understanding between different communities. The challenges of growing crops in the Flagstaff area, for instance, can be broadened to include the specific challenges and traditional agricultural practices within arid Indigenous lands, making the learning deeply relevant to local and regional contexts.

Positionality Statement

As a high school computer teacher, I bring to the classroom a background rich in technological expertise, including coding, digital design, and an understanding of various software applications. My previous experience as a high school special education transition teacher has also equipped me with a deep commitment to inclusive education, differentiated instruction, and fostering independent learning pathways for all students. I understand the importance of scaffolding learning, providing multiple means of engagement and expression, and recognizing the unique strengths each student brings. This experience informs my pedagogical approach, ensuring that complex computer science concepts are accessible and empowering.

However, I acknowledge that my primary lived experience does not encompass Indigenous cultures or the specific historical and contemporary realities of the Apache community. While I am passionate about culturally responsive pedagogy and have dedicated myself to understanding best practices, my "funds of knowledge" in these specific cultural contexts, local histories, languages, and traditional ecological knowledge (TEK) are limited. I recognize that true cultural sustainability in the classroom comes from authentic partnership and humility.

Therefore, my students, particularly those with Apache heritage, and the Cibecue Apache community will serve as invaluable resources in this curriculum unit. I explicitly position myself as a co-learner in this journey, eager to grow my knowledge of Cibecue Apache cultural contexts, history, and the profound wisdom embedded in their traditional practices concerning water, land, and food. Guest speakers directly from the Cibecue community—including elders or individuals with specific knowledge of environmental and food security issues in Cibecue—will be integral to enriching the unit's content. By creating a space where students' lived experiences

and cultural knowledge are not just acknowledged but are central to the problem-solving process, we will collectively elevate culturally sustaining and responsive practices. This collaborative learning environment ensures that the curriculum is not only taught but also shaped by the very voices and wisdom it seeks to uplift, fostering mutual respect and authentic engagement.

Instructional Guide

The purpose of the "Digital Innovations for Sustainable Futures" unit is to empower high school computer science students to become active participants in addressing critical environmental and food security challenges within the Cibecue Apache community, utilizing digital innovation as a tool for positive change. This unit covers essential subject matter at the intersection of computer science, environmental science, and cultural studies, aiming to foster computational thinking, design skills, and a deep understanding of culturally relevant problem-solving.

Essential Background Ideas and/or Concepts

1. **Sustainable Development Goals (SDGs):** Specifically, SDG #2 (Zero Hunger), SDG #6 (Clean Water and Sanitation), and SDG #15 (Life on Land). Students will need an introductory understanding of what these global goals entail and their significance on a local and global scale.
2. **Environmental Challenges in Arid Lands:** Concepts related to water scarcity, land degradation, forest health (e.g., post-fire restoration), biodiversity, and the unique challenges of food production in desert environments.
3. **Traditional Ecological Knowledge (TEK):** Understanding TEK as a valid and critical scientific knowledge system, particularly Cibecue Apache TEK related to water management, sustainable land stewardship, and traditional food systems. This will

involve exploring how Indigenous peoples have historically and currently developed sustainable practices.

4. **Design Thinking Process:** Emphasizing empathy, problem definition, ideation, prototyping, and testing as a cyclical approach to innovation.
5. **Computational Thinking:** Decomposition, pattern recognition, abstraction, and algorithmic thinking as applied to real-world problems and digital solutions.
6. **Digital Prototyping and Simulation:** The concept of using digital environments (like Minecraft) to model and test solutions before physical implementation.
7. **Introduction to AI/Robotics Concepts:** Basic understanding of how machines, robots, or AI can be designed to perform tasks, collect data, or make decisions to address specific problems.
8. **Digital Citizenship and Privacy:** The ethical considerations of using technology, including data privacy and respectful representation, especially concerning community members and cultural protocols.

Unified and Coherent Summary Explanation of the Teaching Strategies, Sequence of Lesson Plans, Assessment Plan

This unit employs a robust Project-Based Learning (PBL) framework, emphasizing student-driven inquiry, collaborative teamwork, and authentic outcomes. The pedagogical approach is centered on "Unearthing Joy," where students are empowered to leverage their innate 'genius' and creativity to solve problems that resonate deeply with them and their community. The sequence is structured into three main phases: Spark & Scope, Deep Dive & Design, and Refinement & Real-World Impact.

1) **Phase 1: Spark & Scope (Weeks 1–2):**

    a) **Entry Event:** Begin with compelling multimedia (documentaries, presentations) highlighting the environmental beauty and challenges in Cibecue, specifically around water, land, and food security. Introduce the relevant SDGs (#2, #6, #15) and their local implications. A crucial element will be a guest speaker—ideally a Cibecue elder or an individual with direct knowledge of environmental and food security issues within the Cibecue Apache community—to share insights into traditional ecological knowledge (TEK) and current community needs.
    b) **Driving Question:** Introduce the overarching driving question: "How might we, as digital innovators, design and advocate for a sustainable solution within the Cibecue Apache community that directly addresses challenges related to Zero Hunger (SDG #2), Clean Water and Sanitation (SDG #6), or Life on Land (SDG #15), leveraging technology and our collective imagination?"
    c) **Problem Identification:** Students form diverse teams (2–4 members) and collaboratively identify a specific local problem in Cibecue related to one or more of the chosen SDGs. This requires initial research and explicit connection of their chosen problem to SDG targets and indicators, fostering 'criticality' and intellectual growth.

2) **Phase 2: Deep Dive & Design (Weeks 3–5):**

    a) **Research & Inquiry:** Teams conduct extensive research. This includes local investigations (impact on Cibecue, community surveys), in-depth exploration of

Cibecue Apache TEK regarding their chosen problem area (e.g., traditional water harvesting, sustainable food practices), global context (how similar challenges are addressed worldwide), and a scan of existing technologies.

b) **Ideation & Digital Prototyping:** This is the core design phase. Teams brainstorm innovative solutions, ensuring cultural appropriateness for Cibecue. Students then use Minecraft Education Edition to design and build a digital prototype or interactive model of their proposed solution. This involves designing **their own machines, robots, or AI technology** concepts within Minecraft to solve the problem. Examples include automated irrigation systems, pollution-monitoring robots, or AI-driven planting guides. Other digital tools (Figma, data visualization, game development platforms) are also options, but Minecraft is central to the machine/robot/AI design. This phase directly allows students to 'unleash their imagination' and apply 'skills' in a highly 'creative' and 'transformative' way (PICRAT model).

3) **Phase 3: Refinement & Real-World Impact (Weeks 6–8):**

a) **Feedback & Iteration:** Teams present their prototypes and SDG connections to peers, other teachers, and, ideally, Cibecue community members, tribal representatives, or elders for constructive feedback. This feedback is critical for refining their designs, embodying the iterative nature of tech development, and ensuring cultural sensitivity.

b) **Presentation & Advocacy:** Students create compelling final presentations. To address student privacy concerns, especially for Apache students, they will have

the option to develop a **"podcast radio" or "podcast live"** presentation, or to **animate their video presentations using AI applications**. This allows them to narrate their Minecraft world and prototype without showing their identities, using animated characters or abstract visuals to convey their message. The presentation will clearly explain the problem, research, innovative digital solution (including their designed machine/robot/AI), its impact, and a call to action.

c) **Culminating Event:** Projects will be showcased at an authentic event (e.g., the INE Showcase on November 8th), presenting to school administrators, tribal council members, environmental/agricultural programs, or Cibecue community elders. This empowers student voices as agents of change.

Culturally Responsive and Sustaining Practices Implementation

This unit is intentionally designed to integrate culturally responsive and sustaining practices, moving beyond mere acknowledgment to active validation and incorporation of students' cultural identities and community contexts.

1) **Centering Indigenous Knowledge:** The explicit focus on researching and integrating Cibecue Apache Traditional Ecological Knowledge (TEK) is a cornerstone. This challenges traditional educational hierarchies by recognizing and validating Indigenous knowledge systems as critical and scientifically rigorous. As Gay (2018) posits, "Culturally responsive teaching uses the cultural characteristics, experiences, and perspectives of ethnically diverse students as conduits for teaching them more effectively" (p. 29). By doing so, it ensures that Apache students see their heritage as a strength and a source of innovation.

2) **Community-Based Problem Solving:** The unit anchors learning in genuine, local problems faced by the Cibecue community. This moves away from abstract, disconnected learning, making the curriculum immediately relevant and meaningful to students' lives and their potential future roles within their communities (Ladson-Billings, 2014). Students are not just learning *about* problems, but are actively engaging in designing solutions *for* their community.
3) **Fostering Identity and Agency:** By connecting computer science skills to cultural identity and ancestral lands, the unit empowers Apache students to see themselves as "digital innovators" and agents of change within their own cultural context. This fosters a sense of pride, competence, and ownership over their learning, which is crucial for engagement and academic success (Paris & Alim, 2017).
4) **Inclusive Technology Use & Privacy:** The choice of Minecraft Education Edition provides a familiar and engaging platform that can reduce intimidation. Furthermore, the proactive incorporation of AI-powered animation for presentations directly addresses the specific cultural sensitivities around photography and video for Apache students. This thoughtful approach ensures all students can participate equitably and feel safe in their expression, demonstrating respect for cultural protocols.
5) **Critical Consciousness and Social Justice:** By engaging with SDGs and issues of equitable access to resources, students develop a critical understanding of social injustices and are encouraged to design solutions that promote equity and liberation within the Cibecue community. This aligns directly with TLSI's focus on social justice and challenging oppressive systems.

6) **Collaborative Learning:** The unit's emphasis on diverse teams and peer feedback aligns with the CSIS principle of fostering collaborative learning environments that leverage the collective strengths of all students.

Teaching Plan

School/District: Dishchii'bikoh Community School

Course: High SchoolIntroduction to Computer Fundamentals

Unit Title: Digital Innovations for Water, Land, and Food Stewardship in Cibecue (Apache Innovations for Our Future)

Grade Level(s): High School (Grades 9–12)

Topics/Subject Matter

1) Sustainable Development Goals (SDG #2: Zero Hunger, SDG #6: Clean Water and Sanitation, SDG #15: Life on Land)
2) Environmental Science: Water quality, conservation, land degradation, forest health, biodiversity, sustainable agriculture, food systems.
3) Cibecue Apache History & Culture: Traditional Ecological Knowledge (TEK), historical and current land/resource management practices, foodways.
4) Computer Science: Design Thinking, Problem-Solving, Digital Prototyping (Minecraft Education Edition), Introduction to Algorithms, Robotics, and Artificial Intelligence (AI) concepts, Data Visualization, Digital Citizenship, Privacy.
5) Communication & Advocacy: Podcasting, Digital Animation (AI-assisted), Presentation Skills.

Learning Objectives/Alignment to Standards

Learning Objectives: Students will be able to:

1) Identify and articulate a specific community problem in Cibecue related to water, land, or food security, connecting it to relevant Sustainable Development Goals (SDG #2, #6, #15).
2) Conduct in-depth research on the chosen problem, integrating local Cibecue community perspectives, global contexts, and Cibecue Apache Traditional Ecological Knowledge (TEK).
3) Apply design thinking principles to brainstorm and develop innovative digital solutions (machines, robots, or AI concepts) for their identified problem.
4) Construct a digital prototype of their solution within Minecraft Education Edition, demonstrating its functionality and potential impact.
5) Communicate their research findings, proposed solution, and its societal impact through a culturally appropriate and privacy-conscious digital presentation (podcast or AI-animated video).
6) Critique and refine their digital prototypes and presentations based on constructive feedback, demonstrating an iterative design process.
7) Reflect on their learning journey, collaborative contributions, and the role of technology in addressing real-world community challenges.

Alignment with Standards

1. **ISTE Standards for Students:**
    a) **1. Empowered Learner:** Students set goals, leverage technology to achieve them, and reflect on their learning (e.g., problem identification, prototype refinement, reflection journal).
    b) **2. Digital Citizen:** Students address ethical technology use, particularly privacy with AI animation, and social responsibility in community problem-solving (e.g., privacy protocols, SDG equity focus).
    c) **3. Knowledge Constructor:** Students curate diverse resources, including Apache TEK, to build knowledge and design solutions (e.g., in-depth research, synthesis for prototype design).
    d) **4. Innovative Designer:** Students identify authentic problems, use design processes, and create novel digital solutions (e.g., Minecraft machines/robots/AI, iterative design).
    e) **5. Computational Thinker:** Students decompose problems, design algorithms for digital solutions, and evaluate models (e.g., designing robot/AI logic, analyzing prototype effectiveness).
    f) **6. Creative Communicator:** Students articulate ideas using varied digital media (Minecraft, podcasts, AI animation) while respecting cultural sensitivity (e.g., final presentations, AI animation for privacy).
    g) **7. Global Collaborator:** Students work in teams, connect local problems to global SDGs, and engage with community stakeholders (e.g., team projects, SDG connections, community feedback sessions).

2) **Arizona Computer Science Standards (High School):**

   a) **HS.AP.A.1 (Algorithms and Programming – Algorithms):** Create prototypes that use algorithms for practical intent, personal expression, or to address a societal issue. (Directly aligned with designing machines/robots/AI in Minecraft).

   b) **HS.AP.PD.1 (Algorithms and Programming – Program Development):** Evaluate and refine computational artifacts to make them more usable and accessible. (Addressed through feedback and iteration cycles, focus on cultural appropriateness).

   c) **HS.AP.PD.2 (Algorithms and Programming – Program Development):** Use team roles and collaborative tools to design and iteratively develop computational artifacts. (Addressed through team projects and iterative design process).

   d) **HS.AP.PD.3 (Algorithms and Programming – Program Development):** Document design decisions using text, graphics, presentations, and/or demonstrations in the development of complex programs. (Addressed through comprehensive final presentations including visual and audio elements).

   e) **HS.DA.CVT.1 (Data and Analysis – Collection, Visualization and Transformation):** Create interactive data visualizations using software tools to help others better understand real-world phenomena. (Addressed as an optional tool, and implicitly through data representation in Minecraft models).

   f) **HS.DA.IM.1 (Data and Analysis – Inference and Models):** Analyze computational models to better understand real-world phenomena. (Addressed by creating and analyzing Minecraft prototypes as models of solutions).

g) **HS.IC.C.1 (Impacts of Computing – Culture):** Evaluate the ways access to computing impacts personal, ethical, social, economic, and cultural practices. (Central to the unit's focus on cultural relevance and community impact).

h) **HS.IC.C.2 (Impacts of Computing – Culture):** Test and refine computational artifacts to reduce bias and equity deficits. (Addressed through emphasis on culturally appropriate, equitable solutions and feedback loops).

i) **HS.IC.SI.1 (Impacts of Computing – Social Interactions):** Analyze the impact of collaborative tools and methods that increase social connectivity. (Addressed through team collaboration and using digital tools for communication/advocacy).

j) **HS.IC.SLE.1 (Impacts of Computing – Safety, Law, and Ethics):** Explain the beneficial and harmful effects that intellectual property laws can have on innovation. (Implicitly addressed through discussions of ethical AI use, data privacy, and respectful sourcing of information).

3) **CRAIS Tool Principles (Culturally Responsive and Intercultural Assessment Scale / TLSI: Transformative Learning for Social Justice and Inclusion / CSIS: Culturally Sustaining Instruction Scale):**

a) **Community and Contextual Relevance:** The entire unit is built upon identifying and addressing real-world problems within the Cibecue community, connecting learning directly to students' lived experiences and local context. This aligns with CSIS principles of making learning personally and culturally meaningful.

b) **Integration of Indigenous Knowledge Systems:** The explicit focus on researching and valuing Cibecue Apache Traditional Ecological Knowledge (TEK) as a source of solutions challenges Western-centric views of knowledge

and validates Indigenous epistemologies. This is central to TLSI's aim for transformative learning by valuing diverse ways of knowing.

c) **Empowerment and Agency:** Students are empowered to choose their problem, design innovative solutions, and advocate for change within their community. This fosters a sense of agency and positions students as knowledge creators and problem-solvers, aligning with CSIS's emphasis on student voice and self-determination.

d) **Cultural Safety and Privacy:** The proactive measure of offering AI-animated videos or podcasts for presentations specifically addresses privacy concerns for Apache students, creating a culturally safe space for expression. This demonstrates a deep commitment to respecting cultural protocols and ensuring equitable participation.

e) **Critical Consciousness and Social Justice:** By engaging with SDGs and issues of equitable access to resources, students develop a critical understanding of social injustices and are encouraged to design solutions that promote equity and liberation within the Cibecue community. This aligns directly with TLSI's focus on social justice and challenging oppressive systems.

f) **Collaborative Learning:** The unit's emphasis on diverse teams and peer feedback aligns with the CSIS principle of fostering collaborative learning environments that leverage the collective strengths of all students.

Instructional Strategies

1) **Project-Based Learning (PBL):** Anchored by a compelling driving question and culminating in authentic products and presentations.
2) **Inquiry-Based Learning:** Students drive their own research and problem-solving process.
3) **Collaborative Learning:** Teams work together, fostering peer-to-peer teaching and shared responsibility.
4) **Design Thinking Process:** Structured approach to problem identification, ideation, prototyping, and iteration.
5) **Culturally Responsive Pedagogy:** Integration of Cibecue Apache TEK, Cibecue community guest speakers, and focus on culturally appropriate solutions.
6) **Differentiated Instruction:** Varied tool options, flexible scaffolding, and multiple means of expression (e.g., AI animation, podcasting) to support diverse learners.
7) **Direct Instruction/Mini-Lessons:** As needed, for technical skills (e.g., Minecraft features, basic AI concepts, podcasting tools) or background content (e.g., SDGs, environmental science basics).
8) **Technology Integration:** Extensive use of Minecraft Education Edition, potential for other digital design tools, and AI applications.

Learning Resources

1) Minecraft Education Edition software and licenses.
2) Access to computers/laptops with internet connectivity.
3) Curated online resources for SDGs (UN website, specific environmental organizations).

4) Documentaries/videos on Cibecue Apache community, water issues, land stewardship, and food security in arid lands.
5) Guest speakers: Cibecue elders or individuals with direct knowledge of environmental and food security issues within the Cibecue Apache community.
6) Research guides and graphic organizers for local investigation and TEK research.
7) Rubrics for project phases, presentations, and reflection.
8) Tutorials for Minecraft features, building machines/robots, or basic AI concepts within Minecraft.
9) AI animation tools (e.g., Adobe Express Animate, Synthesia - if available/feasible, or similar free/trial options for AI-driven animation from audio).
10) Podcasting equipment/software (e.g., Audacity, GarageBand, simple recording apps).
11) Worksheets for design thinking phases (empathy maps, ideation matrices).
12) Reflection journal prompts.
13) Examples of successful Minecraft builds for problem-solving (e.g., Elm Trees Exterminator)

14) **Assessment**

1) **Formative Assessments:**
    a) **Research Logs/Journals:** Regular checks on progress, depth of research (including TEK), and connection to SDGs.
    b) **Design Sketches/Brainstorming Documents:** Review of initial ideas, machine/robot/AI concepts.
    c) **Prototype Progress Check-ins:** Monitoring Minecraft world development, functionality of digital designs.

d) **Peer Feedback Sessions:** Structured peer review of prototypes and early presentation drafts.

e) **Teacher Observation:** Ongoing observation of teamwork, problem-solving, and engagement.

2) **Summative Assessments:**

a) **Digital Prototype/Model (in Minecraft Education Edition):**

i) **Tools:** Teacher observation of functionality, creativity, clarity of the solution.

ii) **Rubric:** Assesses how well the designed machine, robot, or AI concept addresses the chosen SDG problem within the Cibecue context, feasibility of the concept, and technical execution within Minecraft.

b) **Research Synthesis Document:**

i) **Tools:** Written report or digital presentation summarizing findings.

ii) **Rubric:** Evaluates depth and quality of research (local, global, Cibecue Apache knowledge), clear connection to SDG(s).

c) **Final Presentation & Advocacy (Podcast or AI-Animated Video):**

i) **Tools:** Rubric assessing clarity, persuasiveness, visual/audio appeal, and strong articulation of the problem, solution, SDG connection, and call to action.

ii) **Note:** Assessment will explicitly consider how effectively the chosen podcast/animation method conveys the project while maintaining student privacy.

d) **Reflection Journal/Portfolio:**

i) **Tools:** Collection of reflective writings.

ii) **Rubric:** Assesses students' insights into their learning journey, challenges overcome, collaborative contributions, and the 'joy' experienced, particularly how their solutions contribute to a more sustainable Cibecue and how the project connected to their identity and intellect.

e) **PBL/CHRE Rubric:** A comprehensive rubric designed to assess not only technical skills but also collaboration, critical thinking, cultural responsiveness and sensitivity in problem framing/solutions (especially regarding Apache water, land, and food stewardship), and clear evidence of 'genius' and 'joy' in their process and product. This aligns with culturally specific assessment principles.

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