CULTURALLY RELEVANT ENGINEERING DESIGN FRAMEWORK

PROJECT ExCEED

IDENTIFY

Identify relevant, community-based needs or problems

Ask questions, gather information from daily experiences, whole group discussion, community walks, and outreach with Elders, community members, local organizations to define need or want

DESCRIBE

Describe need, impact of issue on community/way of life/cultural values

Characterize and analyze system: causes, if and how it has changed over time, other societal factors

- Align to NGSS, science content
- Interdisciplinary connections/standards
- Integrate narratives from local cultural communities
- Invite guest speakers from local community
- Small group research – impact over time, on environment, on community members, previous solutions
- Investigate if disproportionate impact of issue as compared with other communities

INSTRUCTIONAL GOALS

High expectations

Cultural competence

Student empowerment

Identifying societal inequities

Community-based learning and problem-solving

Integration of content areas

Multi-cultural, multi-perspective instruction

Education of the whole child

GENERATE

Brainstorm possible solutions

Evaluate design ideas based on criteria, community impact

Refine, consolidate ideas

Select solution best reflecting criteria and community values

- Research and communicate solution ideas in small groups
- Integrate information on tools, engineering contributions from local cultural community
- Discuss how solutions will impact community
- Conduct materials testing
- Apply arts-based / multiple approaches for sharing of ideas – sketches, models, diagrams, written claims

EVOLVE

Reassess design based on needs changing, technology evolving

- Revisit needs/solutions at other points throughout year
- Grade levels build on prior grade levels' solutions

EMBODY

Design and create solution

Carry out fair tests and evaluate design – against criteria, community values, expectations

Refine and improve design based on data from tests

- Small group iterative process
- Group roles
- Documentation of data, evidence
- Additional research
- Integration of STEM concepts, literacy, technology, art to design and create new iterations
- Constant comparison against criteria and community goals/needs/values

FINALIZE

Finalize and share design with local community members

- Choice in format of presentations
- Students as experts
- Justification of design
- Reflection

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