DATTA Vic STEM Resources

Title: Human-Centred Design Framework

Year level: Year 9

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Description: Use Human-Centred Design to address social issues relevant to students – for example, the issue of healthy living/access to fresh food. This would include Public health, Social work, kitchen gardens, food technology, biology, economics, STEM, sustainability, etc.

Timeline: One semester, on average 100 minutes per week.

- Week 1 – Research (background)
- Week 2 – Bring in expert & establish target goals & constraints
- Week 3 – Research existing products
- Week 4 – Design
- Week 5 - Design (Use other teachers as experts – students can ask questions
- Week 6 – Final Design + CAD
- Week 7 – Prototyping (Bring in cross-curricular info/teachers)
- Week 8 – Prototyping
- Week 9 – Production
- Week 10 – Production
- Week 11 – production
- Week 12 – production
- Week 13 – production
- Week 14 - Evaluation

Resources Required:

- Social-issues experts (Engineers Without Borders, etc)
- Collaborative STEM team (with dedicated time to work on it)
- Materials within constraints

Teacher & Timetabling Approach:

- Team teaching, interdisciplinary Approach (Food Tech, D&T, Science [Biology], Economics, statistics/public health, ecology/sustainability

Curriculum Benchmarking:

Design & Technology Levels 9 & 10

1. *Food & Fibre Production*
   Investigate & make judgements on the ethical and sustainable production and marketing of feed & fibre
2. *Food Specialisations*
   Investigate & make judgements on how the principles of food safety, preservation, preparation, presentation and sensory perceptions influence the creation of food solutions for healthy eating
3. *Engineering Principles & Systems*

Investigate and make judgements on how the characteristics and properties of materials are combined with force, motion and energy to create engineered solutions

4. *Creating Designed solutions*

Investigating – Critique needs or opportunities to develop design briefs and investigate and select an increasingly sophisticated range of materials, systems, components, tools and equipment to develop design ideas

Generating – Apply design thinking, creativity, innovation and enterprise skills to develop, modify and communicate design ideas of increasing sophistication

Producing – Work flexibly to safety test, select, justify and use appropriate technologies and processes to make designed solutions

Evaluating – Evaluate design ideas, processes and solutions against comprehensive creiteria for success recognising the need for sustainability

Planning & Managing – Develop project plans to plan and manage projects individually and collaboratively taking into consideration time, cost, risk and production processes

Science Levels 9 & 10

1. *Biological Sciences*
   Ecosystems consist of communities of interdependent organisms and abiotic components of the environment; matter and energy flow though these systems
2. *Earth & Space Sciences*
   Global systems, including the carbon cycle, rely on interactions involving the atmosphere, biosphere, hydrosphere and lithosphere
3. *Physical Sciences*
   Energy flow in Earth's atmosphere can be explained by the process of heat transfer

Mathematics Level 9
Level 2

1. *Statistics & Probability (Using Community Health Statistics)*
   - List all outcomes for two-step chance experiments, both with and without replacement using tree diagrams or arrays. Assign probabilities to outcomes and determine probabilities for events
   - Calculate relative frequencies from given or collected data to estimate probabilities of events involving 'and' or 'or.
   - Investigate reports of surveys in digital media and elsewhere for information on how data were obtained and to estimate population means and medians
2. *Data Representations and Interpretations*
   - Identify everyday questions and issues involving at least one numerical and at least one categorical variable, and collect data directly from secondary sources
   - Construct back-to-back stem and leaf plots and histograms and describe data, using terms including 'skewed', 'symmetric' and 'bimodal'
   - Compare data displays using mean, median and range to describe and interpret numerical data sets in terms of location (centre) and spread