**Assignment 1:**

**Aim:** Study of Problem Identification.

**Theory:**

1. Background of Arcturus IV Case Study:

- Originating in the 1950s, the Arcturus IV Case Study served as a pedagogical experiment at MIT for teaching creative problem-solving to undergraduate design students.

- Students were tasked with designing products for Methanians, imaginary beings residing on Arcturus IV in the year 2951.

- The primary objective was to cultivate creative thinking and encourage a novel approach to problem-solving.

2. Development by John E. Arnold:

- Conceived and developed by John E. Arnold, the case study aimed to demonstrate that creative thinking is a skill that can be taught and enhanced through practice.

- Arnold believed that challenging students to design for an unfamiliar, fictional world would stimulate engineers to reevaluate their problem-solving methodologies.

3. Success and Continued Use:

- The case study proved successful in achieving its intended goals and has since been employed to teach creative problem-solving across diverse academic disciplines.

- Its enduring use highlights its efficacy in imparting valuable skills related to thinking creatively and approaching problems innovatively.

4. Role in Design Thinking:

* Early Example of Science Fiction Integration:

- The Arcturus IV Case Study is significant in the realm of Design Thinking as it represents an early example of leveraging science fiction to teach creative problem-solving.

- Using an imaginary world prompts engineers and designers to adopt unconventional perspectives and solutions.

* Emphasis on Human-Centered Design:

- A key aspect of the case study is its emphasis on human-centered design principles.

- Students were directed to design products that catered to the needs of the Methanians, prioritizing user requirements over mere technical feasibility.

5. Key Principle of Design Thinking:

- The emphasis on human-centered design in the Arcturus IV Case Study aligns with a fundamental principle of Design Thinking.

- Designing solutions that address the needs of users is a core tenet, reflecting the importance of empathy and user-centric approaches.

6. Teaching Tool for Creative Problem Solving:

- The Arcturus IV Case Study stands as a valuable tool for teaching creative problem-solving skills.

- Through the use of science fiction and human-centered design, it encourages students to think beyond conventional boundaries and generate innovative solutions.

**Implementation:**

**1. Constraints:**

1. Interstellar Distance (10 Light Years Away):

- The considerable distance between Earth and Arcturus IV imposes constraints on communication, transportation, and resource delivery, necessitating innovative solutions for long-distance space travel.

2. Similar Anatomy and Senses to Humans:

- The creatures on Arcturus IV share similar anatomy and senses with humans, posing challenges and opportunities in designing solutions that cater to familiar human needs and experiences.

3. 3x Gravity on Arcturus IV:

- The threefold increase in gravity on Arcturus IV compared to Earth introduces a significant constraint in designing technology and infrastructure, requiring adaptations for mobility, structural integrity, and overall functionality.

4. Taller Stature of Arcturian Creatures:

- The inhabitants of Arcturus IV are taller than humans, presenting constraints in the design of tools, equipment, and living spaces, necessitating adjustments to accommodate their physical characteristics.

5. Atmospheric Composition (CH4 Instead of O2):

- The atmospheric composition on Arcturus IV, with methane (CH4) instead of oxygen (O2), imposes constraints on life support systems, breathing apparatus, and overall technology design to ensure compatibility with this unique chemical environment.

**2. Problems Identified:**

Our group identified the following key issues:

1. Adapting to the 3x Gravity on Arcturus IV

2. Developing Technology Compatible with the Creatures' Physiology

3. Crafting Solutions Considering the Unique Atmospheric Composition (CH4 Instead of O2)

4. Long-Distance Communication and Information Transfer

5. Energy Requirements and Sustainability

6. Cultural and Social Integration

7. Health and Well-being in High-Gravity Environments

8. Resource Management and Recycling

9. Interstellar Navigation and Positioning

10. Legal and Ethical Frameworks

11. Emergency Response and Contingency Planning

**3. Solutions Proposed:**

1. Methane Booster Skateboards :

Introducing a mode of transportation specifically designed to navigate the high-gravity terrain on Arcturus IV, acknowledging the creatures' anatomy.

Features of Methane Booster Skateboard :

1. Extended Deck & Extra-Wide Trucks:

- Longer deck for alien height.

- Wider trucks enhance stability.

2. Customizable Straps & Anti-Skid Surface:

- Adjustable foot straps for secure grip.

- Anti-skid surface for larger foot size.

3. Enhanced Shock Absorption:

- Advanced materials reduce joint impact.

4. Methane-Powered Boosters:

- Optional eco-friendly propulsion.

5. Integrated Communication Hub:

- Embedded hub for visual cues.

6. Adaptive Terrain Wheels:

- Wheels for diverse terrains.

7. Customizable Art Panels:

- Cultural expression through artwork.

8. Height-Adjustable Handlebars:

- Comfortable, adjustable grips.

2. Advanced Space Program:

This innovative solution aims to overcome the challenges posed by the unique conditions on Arcturus IV, integrating cutting-edge technologies into advanced space programs.

Features of Advanced Space Program:

1. Adaptive Gravity Response:

- Electric fields dynamically adapt to Arcturus IV's threefold gravity, enhancing mobility and structural stability for astronauts.

2. Efficient Atmospheric Operation:

- Utilizing electric fields as a protective barrier allows for efficient operation in the thick methane atmosphere, ensuring astronaut safety.

3. Seamless Integration:

- Electric field technology seamlessly integrates with spacecraft systems, creating a cohesive and efficient exploration system.

4. Comprehensive Protective Measures:

- Electric fields serve as both gravitational resistance and innovative protection against environmental challenges, reinforcing astronaut safety.

5. User-Centric Design:

- Prioritizing user comfort and efficiency, the electric field technology ensures astronauts navigate and operate with optimal convenience.

**Conclusion:**

The Arcturus IV Case Study's enduring relevance showcases its role in shaping creative thinking and human-centered design principles, making it a foundational element in learning Design Thinking.