SDG9 Future of Space
MM4:Space Innovation and Enterprise

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Experimentation and Exploration

Lesson 12 Future Possibilities - Space Industry

Subject Areas: CSPE/ SPHE, Design, English and Communication, Science, Sustainability, Technology

Lesson Title and Summary: Future Possibilities - The Space Industry

In this lesson learners will begin to explore the world of entrepreneurship in the space industry, reflecting on their interests, skills, and passions related to space exploration. Through research and exploration, they will identify market needs and opportunities, and create innovative solutions, towards developing clear business ideas to address challenges in the space industry and create their start-up.

Learners will undertake a step-by-step planning for their proposed startup in the space industry, encouraging them to think critically, creatively, and strategically about an entrepreneurial journey.

Vocabulary: Entrepreneur, Innovation, Start-up, Venture

In this lesson, the learner will:

- begin identify personal interests and skills that relate to an area of the space industry and entrepreneurship
- analyse market needs and opportunities by conducting research including trends, challenges, opportunities in the space industry, identifying unmet needs and gaps in the market that their startup ventures could address develop innovative solutions to address identified market needs or challenges in the space industry
- develop a clear business idea outlining their value proposition, target market, and possible funding streams
- think the creativity, innovation, and critical thinking skills necessary for an entrepreneurial journey

Materials

- Worksheet: Considering the possibilities of the future Space Industry
- Worksheet: Start up Space Venture
- Teaching Guide: Setting up a Start-up Hub in a School
- Paper / pens
- AV equipment
- Computers with internet access

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Activity Instructions

Activity 1: Considering the possibilities of the future Space Industry (15 mins)

1. Working individually, ask learners to answer the self-assessment questions on worksheet: 'Considering the possibilities of the future Space Industry'.
2. Remind learners to use the Space Skills Alliance - transferable skills list to consider during their self-assessment
3. Once completed, learners will select up to three areas that interest them from the list of areas in the space industry.
4. Ensure Learners rank these three areas in order of preference 1 - 3 on the worksheet
5. They will try to find another three learners with as close a selection to them as possible, both industry and ranking.
6. These learners will be their start-up business partners for Activity 2

Activity 2: Start up Space Venture (35 mins)

1. Working in teams of four, with their start-up business partners from Activity 1 (step 5 and 6), using Worksheet: Future Space Venture.
2. They will begin by considering their self-assessment skills and passions to assign key roles in the team.
3. Based on their roles and selected space industry sector they will divide the step-by-step questions to help them create the beginnings of their start up.
4. Circulate to encourage learners to explore their answers more thoroughly
5. Depending on time, start-up teams can share their ideas and reflections on the process, e.g.

    - what they found challenging or any insights they gained that are transferable to other roles / parts of their life.

REFLECTIVE EXERCISE: 3-2-1 (10 mins)

- Three things they feel they have learnt from the tasks
- Two things they found most interesting and would like to explore more
- One – their opinion they have about the tasks

Use Post-its or a mentimeter survey - www.mentimeter.com to gather reflections

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EXTENSION / REDUCTION ACTIVITIES

Reduction: For a shorter lesson, complete Activity 1 only and complete Activity 2 in a following lesson. Use any remaining time to summarise their process and consider the next stage / prepare for any following lessons.

Extension: For a longer lesson, continue the discussion from the class sharing and invite learners to share their thoughts on how they can apply entrepreneurial principles and STEAM skills to pursue opportunities in the space industry.

Option B: Learners can develop activity 2 in additional classes. If learners are continuing this activity in follow on lessons, link learners to resources in the Future of Innovation, MM1: Passion to Purpose Module to develop a pitch or explore their market / customers - see linked learning for suggestions and references to other supporting resources.

MEDIA BOX: (materials, online video links, extra resources, case studies etc)

Space Skills Alliance - Transferable Skills https://craft.spaceskills.org/themes/Transferable%20skills

Space Skills Alliance https://spaceskills.org/

Space Skills Alliance Census https://spaceskills.org/census-2020-intro The 2020 Space Census was the first national survey of the UK space workforce.

Careers Portal https://careersportal.ie/sectors/subsectors.php?sub_sector=162&sector_id=21

Enterprise Ireland Company Directory https://www.enterprise-ireland.com/en/supports/become-more-innovative/space-esa-homepage/esa-directory

Local Trip / Expertise / Additional Work and Assessments

Start-up hub: The learning from this lesson and the module can continue by creating a start-up hub and having the teams work over a number of lessons to build out their start-ups, support each other by skills sharing or joining other start-ups or collaborating if there are relationships between the sectors.

Activities from the MM1: Future of Innovation: Passion to Purpose Module can be used to support them to do this

Longer term, consider setting up a start-up hub - see teacher's guide, which could support annual projects in Transition Year.

MM4: 12TG SETTING UP A START-UP HUB IN A SCHOOL

Teacher's Guide for Setting Up a Start-Up Hub in a School

Creating a Start-up Hub within a school provides students with a platform to develop entrepreneurial skills, innovate, and turn ideas into real-world ventures. By creating a structured and supportive environment, a school-based Start-up Hub can foster creativity, problem-solving, and entrepreneurial thinking in students, preparing them for future careers and innovations. Below is a guide to help set up and facilitate such a hub.

Define the Vision and Purpose

- Clarify Objectives: Set a clear purpose for the hub (e.g., fostering entrepreneurial skills, promoting innovation, encouraging teamwork).
- Identify Key Focus Areas: Decide if the hub will target specific industries (e.g., technology, social entrepreneurship, environmental innovation).

Secure Support and Resources

- Administrative Buy-In: Get approval and support from school leadership.
- Space and Infrastructure: Allocate a dedicated space within the school for brainstorming, collaboration, and presentations.
- Budget: Establish a small fund for supplies, prototyping, or hosting events.

Create a Curriculum or Framework

- Incorporate STEAM and Business Principles: Integrate Science, Technology, Engineering, Arts, Math (STEAM) alongside entrepreneurial skills like marketing, financial literacy, and project management.
- Workshops and Sessions: Set up weekly or bi-weekly workshops on topics like:
  - Ideation and creativity.
  - Market research.
  - Branding and marketing.
  - Pitching to investors.

Recruit Mentors and Experts

- Industry Experts: Invite local entrepreneurs, alumni, or business professionals to provide mentorship.
- Partnerships: Collaborate with local businesses or startup incubators to provide real-world insights and potential funding.

Encourage Student Participation

- Project-Based Learning: Allow students to form teams, identify problems, and develop solutions that could turn into viable business models.
- Competitions: Host pitch competitions or challenges where students present ideas to a panel of judges (similar to a Dragon's Den format).

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Develop an Ongoing Support System

- Networking Opportunities: Organise field trips to start-up incubators or tech events. Access to Resources: Provide resources for research, prototyping, and funding (through grants or sponsors).

Assessment and Reflection

- Milestone Reviews: Set checkpoints for students to present progress.
- Reflection: Encourage students to reflect on challenges, solutions, and future plans.

Sample Structure for the Hub

1. Kick-Off Event: Launch the hub with a school-wide event or competition.
2. Weekly Workshops: Each week focuses on a different entrepreneurial skill or startup principle.
3. Mentorship: Monthly check-ins with assigned mentors.
4. Prototype Day: A day where students build and test prototypes of their ideas.
5. Pitch Day: End-of-term presentation where students pitch their startup ideas to a panel of experts.

Key Considerations

- Inclusivity: Ensure students from diverse backgrounds and skill sets feel encouraged to participate.
- Long-Term Impact: Help students see the potential for turning school projects into real-world ventures.
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MM4: 12WS CONSIDERING THE POSSIBILITIES OF THE FUTURE SPACE INDUSTRY

Activity 1 Considering the possibilities of the future Space Industry

The future of space exploration holds vast opportunities for careers and business across various disciplines. As technology advances and humanity's presence in space expands, new opportunities will continue to emerge across sectors of the space industry.

First, answer the self- assessment questions below

Self-Assessment:

1. What aspects of space exploration fascinate and excite you the most?

2. Reflecting on your skills and passions, which areas of the space industry do you feel drawn to? (e.g., science, engineering, entrepreneurship)

3. How can you use your interests and talents to contribute meaningfully to the space industry?

4. Think about how you will explore your selected area of the space industry through education, research, networking, and hands-on experiences and see if this appeals to you?

Use the Space Skills Alliance Transferable Skills list to help you in this self-assessment https://craft.spaceskills.org/themes/Transferable%20skills

Below are just a few examples of the diverse and exciting career / ventures possibilities that the future of space exploration holds. Select one of the Future Possibilities within Space Exploration that interests you most. This will be the focus of your new venture.

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- Space Mining: As technology advances, space mining could become a reality, leading to opportunities for careers in asteroid mining, resource extraction, and space resource utilisation. Professionals in this field may include geologists, mining engineers, roboticists, and space resource specialists.
- Space Colonisation: Establishing permanent human settlements on other planets, such as Mars, presents numerous career opportunities in fields like aerospace engineering, habitat design, life support systems, agriculture, and medicine. Careers in space colonisation may involve roles in research,architecture, design, construction, logistics, and governance.
- Space Manufacturing: In-space manufacturing, utilising resources found in space to produce goods, holds potential for reducing the costs of space exploration and enabling long-duration missions. Careers in space manufacturing may include materials scientists, engineers, 3D printing specialists, and robotics experts.
- Space Science and Exploration: Advancements in space telescopes, probes, and robotic missions offer opportunities for careers in space science and exploration. Professionals in this field may study planets, moons, asteroids, and other celestial bodies to understand their composition, origins, and potential for supporting life.
- Space Medicine and Health: With the increasing duration of space missions and plans for long-term space habitation, there's a growing need for professionals in space medicine and health. Careers in this field may involve researching the effects of microgravity on the human body, developing medical technologies for space travel, and providing healthcare for astronauts.
- Space Law and Policy: As commercial space activities expand, there's a need for legal and policy experts to navigate issues related to space governance, property rights, liability, and international cooperation. Careers in space law and policy may include space lawyers, policymakers, diplomats, and regulatory specialists.
- Space Communications and Navigation: Ensuring reliable communication and navigation systems is crucial for space missions and satellite operations. Careers in space communications and navigation may involve developing satellite networks, ground control systems, and deep space communication protocols.
- Space Environmentalism: With the growing presence of satellites and space debris in Earth's orbit, there's a need for professionals to address environmental concerns in space. Careers in space environmentalism may include space debris mitigation specialists, satellite tracking experts, and sustainability advocates.
- Space Education and Outreach: As public interest in space exploration grows, there's a demand for educators, communicators, and outreach specialists to inspire and educate the next generation of space enthusiasts. Careers in space education and outreach may involve teaching, science communication, museum curation, and public engagement initiatives.

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Activity 2 Startup Space Venture

You are a serial entrepreneur, someone who starts multiple businesses, often stepping back or selling before starting another 1. You are looking at the Space Industry for your latest venture. Use the supporting resource to consider the future possibilities and select the one that interests you most.

Area of the Space Industry for your Venture :

Type of Role: Who's doing what

Consider the roles involved in a start up and review your skills from worksheet one and see how you can assign roles and divide the tasks to answer the questions. These key roles are the basics for a start up - you will have to share responsibilities as you are only a team of 3 / 4, everyone in the team will share the role of founder / Entrepreneur unless there is an obvious team member for this role - this must be decided by the team.

Founder/Entrepreneur:
Responsibilities: The founder or entrepreneur is the visionary leader of the startup, responsible for coming up with the initial idea, setting the overall direction and strategy, and inspiring others to join the journey. They drive innovation, make critical decisions, and oversee the development and growth of the startup.

Product Manager:
Responsibilities: The product manager is responsible for translating the founder's vision into a tangible product or service. They work closely with the development team to define product requirements, prioritize features, and ensure that the product meets the needs of the target market. They also gather feedback from users and iterate on the product to improve its usability and functionality.

Marketing and Communications Specialist:
Responsibilities: The marketing and communications specialist is responsible for promoting the startup's product or service to the target audience. They develop marketing strategies, create compelling content, and execute campaigns across various channels such as social media, email, and events. They also engage with customers, build brand awareness, and communicate the value proposition of the startup to the market.

Technical Lead/Chief Technology Officer (CTO):

Responsibilities: The technical lead or CTO is responsible for overseeing the technical aspects of the startup, including software development, hardware implementation, and technological infrastructure. They lead the technical team, make decisions regarding technology stack and architecture, and ensure that the product is built using best practices and cutting-edge technologies. They also collaborate with other team members to align technical solutions with the overall business strategy and goal

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Operations Manager:

Responsibilities: The operations manager is responsible for managing the day-to-day operations of the startup, ensuring that processes run smoothly and efficiently. They oversee administrative tasks, coordinate logistics, and manage resources such as finances, facilities, and human resources. They also identify areas for improvement and implement solutions to optimize operational efficiency, enabling the startup to scale and grow effectively.

Part 2 Complete the Questions to help you plan your new Space Venture

Once your roles are decided and areas of responsibility divide the questions between the team and work through the ones you are responsible for. You should allow time to share your answers with your start-up business partner to get feedback / more ideas.

Identify Market Needs and Opportunities:

1. What are the current trends and emerging technologies in the space industry?
2. Are there any specific challenges or unmet needs in the space market that your startup could address?
3. How can you conduct market research to gain insights into potential opportunities and gaps in the space industry?
4. Who are the key players and stakeholders in the space market, and how can you learn from their experiences and perspectives?

Problem-Solving and Innovation:

1. What innovative solutions can you brainstorm to address the identified market needs or challenges in the space industry?
2. How can you apply your skills and knowledge to create value and make a positive impact in the space market?
3. What unconventional approaches or out-of-the-box ideas can you explore to solve problems in the space industry?
4. How can you foster a culture of creativity and innovation within your startup team?

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What will your startup focus on:

1. What specific problem or opportunity will your startup address in the space industry?
2. Who are your target customers or stakeholders, and what are their needs and pain points?
3. What unique value proposition does your startup offer, and how does it differentiate from existing solutions?
4. How will you monetise your business idea and generate revenue streams in the space market?

Build a Network and Seek Mentorship:

1. Who are the professionals, experts, and mentors in the space industry that you admire and respect?
2. How can you connect with them through networking events, industry conferences, or online communities?
3. What questions or challenges do you have that could benefit from the insights and guidance of experienced mentors?
4. How can you build and nurture relationships with mentors who can provide valuable advice and support throughout your entrepreneurial journey?

Acquire Relevant Skills and Knowledge:

1. What specific skills and knowledge are essential for success in the space industry and entrepreneurship?
2. How can you continuously learn and acquire these skills e.g. courses, workshops, or hands-on experiences?
3. What resources and learning opportunities are available to help you develop your entrepreneurial skills and expertise?
4. How can you leverage your strengths and talents while also building new skills to adapt to the dynamic nature of the space industry?

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Prototype and Test:

- What features or functionalities will your prototype or MVP (Minimum Viable Product) have to address the identified market needs?
- How can you design and develop a prototype that effectively demonstrates the value proposition of your startup to potential customers or stakeholders?
- What feedback mechanisms and testing methods will you use to gather feedback and validate your assumptions about your startup idea?
- How will you iterate and refine your prototype based on the feedback received to ensure that it meets the needs and expectations of your target market?

Secure Funding and Resources:

1. What are the different funding options available to support your startup in the space industry (e.g., grants, investors, crowdfunding)?
2. How can you prepare a compelling pitch or business plan to attract potential investors or funders to support your startup?
3. What resources and support services are available through incubators, accelerators, or co-working spaces to help you launch and grow your startup?
4. How can you leverage your network and connections to access funding and resources that will enable your startup to succeed in the competitive space market?

Execute and Iterate:

1. What specific action steps will you take to execute your business plan and launch your startup in the space industry?
2. How will you measure and track the progress and performance of your startup against your goals and milestones?
3. What strategies and mechanisms will you implement to gather feedback from customers and stakeholders and iterate on your product or service?
4. How will you adapt and pivot your startup based on the lessons learned and insights gained from your experiences in the space market?