

# STEM Learning Package

The impacts we innovate

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If you want something new, you have  
to stop doing something old.

Peter F. Drucker

Genius, in truth, means little more than the faculty of perceiving in an unhabitual way.

William James

The greater the contrast, the greater the potential. Great energy only comes from a correspondingly great tension of opposites.

Carl Jung

We don't know who discovered water,  
but we're certain it wasn't a fish.

John Culkin

# Learning intention & student outcomes



## Part 1: Predicting local trends of work

Trends occur within every industry and can provide businesses with important data to help them remain competitive in the marketplace through innovation.

- Students will study the industrial history of their region. They will identify trends that influenced lapsed businesses and the working trends that replaced them.
- Students discover the fluidity of the business world while paying close attention to the traces of contributions made by ‘older industries’ to their current communities. The main question being investigated is ‘what factors influence the rise and fall of industries?’.

*For example:* Students may identify issues such as water management, drought, disease in plants/animals, climate variability etc.

- Students will create local prediction reports. These reports can be produced with a specific industry or business in mind. These reports will contain three components of information: a global pattern, a local pattern, and a 'cause and effect' analysis of those patterns. In their reports, students will identify work patterns or trends that occur within a specific industry in a global context to then transfer their understanding to make predictions in a local context.

*For example:* They might identify changes in rural agricultural areas in the USA or Europe, and use that knowledge to identify similar patterns in their region. These predictions will inform students contextual understanding of the world of work around them in the present as well as the near future.

## Part 2: Designing my 2030 world of work

Theoretically, all the Year 7 students will be fully immersed into the world of work in 2030.

- Students will inform the changes they want to see in the world of work in 2030 by re-imagining what they want it to look like.
- Based on their imagining and on their predictions, students design a local industry improvement for an existing business or create a new product, service or system that they think will fill a locally identified market need.
- Students do market research and enquire with their community to gain insights into local interest and receptiveness to their idea.
- Students seek to receive their community's and intended audience feedback for iterating their designs.

## Part 3: Pitch presentations

- Students provide proof of their local work trend directed towards their solution, they communicate the identified need for their solution in the market and present their iterated business idea as a clear solution with economic benefits to their regional area.
- Students collaborate to design a pitch presentation addressed to the intended audience within their community.

There's a way to do it better – find it.

Thomas A. Edison

Learning and innovation go hand in hand. The arrogance of success is to think that what you did yesterday will be sufficient for tomorrow.

William Pollard

The people who are crazy enough  
to think they can change the world  
are the ones who do.

Rob Siltanen

# ACARA Learning Areas

## Year 7 Science

*Achievement standards:* Students identify questions that can be investigated scientifically. They plan fair experimental methods, identifying variables to be changed and measured. They select equipment that improves fairness and accuracy and describe how they considered safety. Students draw on evidence to support their conclusions. They summarise data from different sources, describe trends, and refer to the quality of their data when suggesting improvements to their methods. They communicate their ideas, methods, and findings using scientific language and appropriate representations.

# ACARA Learning Areas

## Year 7 & 8 Design and Technology

*Achievement standards:* By the end of Year 8, students explain how social, ethical, technical, and sustainability considerations influence the design of innovative and enterprising solutions to meet a range of present and future needs. They explain how the features of technologies influence design and production decisions. Students make choices between different types of networks for defined purposes. Students explain a range of needs, opportunities or problems and define them in terms of functional requirements and constraints. They collect, authenticate, and interpret data from a range of sources to assist in making informed judgements. Students generate and document in digital and non-digital form design ideas for different audiences using appropriate technical terms and graphical representation techniques, including algorithms.

They independently and safely plan, design, test, modify, and create a range of digital solutions that meet intended purposes, including user interfaces and the use of a programming language. They plan, document, and effectively manage processes and resources to produce designed solutions for each of the prescribed technologies contexts. They develop criteria for success, including innovation and sustainability considerations, and use these to judge the suitability of their ideas, solutions, and processes. Students use appropriate protocols when collaborating, and creating and communicating ideas, information, and solutions face-to-face and online.

# ACARA Learning Areas

## Year 7 HASS

### Economics and Business

*Achievement standards:* When researching, students develop questions and gather data and information from different sources to investigate an economic or business issue. They interpret data to identify trends. They propose alternative responses to an issue and assess the costs and benefits of each alternative. They apply economics and business knowledge, skills and concepts to familiar problems. Students develop and present conclusions using appropriate texts, terms and concepts. They identify the effects of their decisions and the possible effects of alternative actions.

Note: Ideally, but not necessarily, the learning would be implemented via a collaborative teaching team including teachers from each learning area.

# Pedagogical/Androgogical/Heutagogical Options

Cross-disciplinary learning package for:

- Enquiry based learning
- Project/Problem-based learning
- STEM-focused learning design
- Iterative design, valuing failure as stepping stones

Provides teachers with resources for delivering the learning intentions against cross-disciplinary ACARA achievement standards.

Teachers are encouraged to provide students with self-directed learning opportunities rather than opting to deliver in traditional teacher-guided modes.

# General capabilities

- **Critical & Creative Thinking:** Generating ideas, possibilities and actions. Reflecting on, adjusting and explaining their thinking and identifying the thinking behind choices, strategies and actions taken
- **Critical & Creative Thinking:** Identifying, exploring, organising information and ideas; posing questions and identifying and clarifying information and ideas, and then organising and processing information
- **Literacy:** Composing through speaking
- **Personal & Social:** Social Awareness

# Entrepreneurial skills & dispositions

- Recognise opportunities
- Problem posing
- Problem-solving
- Creativity
- Reflective thinking
- Curiosity and inquisitiveness
- Transferring past knowledge to new situations
- Communication
- Collaboration

# Time duration

Day's challenge to full term's study

# Mode

Face to face | Online in synchronous & asynchronous learning

- Can be delivered across a collaborative class shared between Science, Design Technology and HASS teachers

# Lesson implementation

Lesson aims:

- Familiarise students with their local industry and its history
- Understand the intended learning and learning objectives
- Help students understand that a problem is a need not yet met and therefore an opportunity to unlock value

# Task summary

1. Predicting local trends of work
2. Designing my 2030 world of work
3. Pitch presentations

## Part 1: Predicting local trends of work

- Students investigate their local industry and how it has evolved and changed their rural history. This may include interviewing their elders, local businesses, and doing secondary research online for any information that might help them identify trends within the world of work in their region. They may choose to capture the differences between the business sectors now compared to a few years ago. Explain to students that they will be researching their local industry's history while exploring the impacts those industries have left within their communities today.
- Help students understand that the purpose of their research is to identify trends that will inform their creative process, creating new solutions for current local needs.
- Students design interviews, surveys or other research methodologies to obtain insights into the local changes in the world of work.

- Students gather data and present their findings to the class to start collating a collaborative picture that may highlight the industry trends and changes over time. During their research, students identify the area of need they would like to innovate and therefore establish their intended audience for their innovation.

## Part 2: Designing my 2030 world of work

In response to their findings in Part 1:

- Students identify a local need for innovation. It could be a local industry improvement for an existing business or create a new product, service or system that they think will fill a locally identified market need. Their identified need will be supported by data from their previously identified trends. The identified need might be an idea from somewhere else around the globe, but it must be contextualised to fit students local region. The student's innovation must address the identified problem/need.

- Students generate, develop, test and communicate their design ideas, plans and processes for getting feedback from their identified intended audience. Their design idea/innovation must be communicated using appropriate technical terms and technologies, including graphical representation techniques.

Note: Student design innovations must be iterated/improved based on audience feedback. In order to capture the best feedback for improvement, tools to gather feedback are designed by each group/individual according to their own success criteria.

## Part 3: Pitch presentations

- Students collaborate to design a pitch presentation addressed to the intended audience within their community. In each pitch presentation, students provide proof of their identified trend, their identified need and how their idea/innovation is addressing both.
- Students share audience data as evidence that their idea/innovation is in fact a solution.
- Students present their iterated idea as a clear solution with evidence of the value and projected economic benefits to their regional area.

## Pitch inclusions

All students must participate in the creation of a pitch which includes:

- Data on an identified trend or problem
- An idea/innovation linked to the work trend or identified need, evidenced through feedback, and that is beneficial to the intended audience

Note: Components of Media Arts may be incorporated through the possible production of a 'Kickstarter' pitch video. Alternatively, posters, slides, prototypes and marketing materials may also be included. Teachers are encouraged to use additional inclusions as opportunities to cross-collaborate with other learning areas.

## Example Project 1: Dairy Industry

1. Students may have identified a trend in the dairy industry. They saw patterns in global and local consumption of alternative milk.
2. Students could explore the suitability and feasibility of growing alternative products on the limestone coast according to soil, weather and existing infrastructure. Their innovation may be a completely new type of milk farm, which allows every neighbourhood to produce and process a small amount of produce into an alternative milk product.
3. Students identify the biggest local business producers of milk and pitch their futuristic idea with the aim to provide adaptation solutions to the predicted changes in the market.

## Example Project 2: Farming Industry

1. Students may have identified a trend in the farming industry. They saw automation patterns globally and locally.
2. Students could explore the suitability and feasibility of using drones to monitor crops and survey and herd cattle. Their innovation may be a type of herding drone with special sound effects, or perhaps a soil sample gathering drone.
3. Students identify the largest farms in the southeast and pitch their futuristic idea with the aim to provide adaptation solutions to the predicted changes in the market.

## Example Project 3: Water Management

1. Students may have identified a problem with the water management in the limestone coast drainage systems. They saw the implications that management and climate have had on drainage systems in the limestone coast.
2. Students explore the suitability and feasibility of using the drains for fish and shellfish farming. Their innovation may be a type of seasonal farming system or product taken from examining global examples of using drainage systems for alternative uses while keeping the limestone coast's unique context in mind.
3. Students identify SE Drainage stakeholders and pitch their futuristic idea with the aim to provide adaptation solutions to their identified predicted changes.

# Resources



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# Additional resources

- Entrepreneurial Education Teacher Practice Guide
- History of the South East Drainage System
- Limestone Coast Region
- Dairying in the South East
- Department of Primary Industries & Regions SA
- Regional Development South Australia (RDSA)
- Primary Industries

- Regional Coordinator Contacts and Map
- Regional Australia Institute (RAI)
- The Limestone Coast
- Limestone Coast Industry Problems
- Limestone Coast Landscape Board's Teaching Resources

# Content descriptors



# Design & Technology

## Knowledge and Understanding

- Investigate the ways in which products, services and environments evolve locally, regionally and globally and how competing factors including social, ethical and sustainability considerations are prioritised in the development of technologies and designed solutions for preferred futures (ACTDEK029)
- Analyse ways to produce designed solutions through selecting and combining characteristics and properties of materials, systems, components, tools and equipment (ACTDEK034)

## Process and Production Skills

- Critique needs or opportunities for designing and investigate, analyse and select from a range of materials, components, tools, equipment and processes to develop design ideas (ACTDEP035)
- Generate, develop, test and communicate design ideas, plans and processes for various audiences using appropriate technical terms and technologies including graphical representation techniques (ACTDEP036)
- Independently develop criteria for success to evaluate design ideas, processes and solutions and their sustainability (ACTDEP038)
- Use project management processes when working individually and collaboratively to coordinate production of designed solutions (ACTDEP039)

# HASS - Economics and Business

## Knowledge and Understanding

- *Why individuals work, types of work and how people derive an income (ACHEK020)*
- *Questioning and Research: Gather relevant data and information from a range of digital, online and print sources (ACHES022)*
- *Interpretation and Analysis: Interpret data and information displayed in different formats to identify relationships and trends (ACHES023)*
- *Economic Reasoning, Decision-making and Application: Apply economics and business knowledge, skills and concepts in familiar and new situations (ACHES025)*
- *Communication and Reflection: Present evidence-based conclusions using economics and business language and concepts in a range of appropriate formats, and reflect on the consequences of alternative actions (ACHES026)*

# Science

- *Science as a Human Endeavour/ Use and Influence of Science:* Solutions to contemporary issues that are found using science and technology, may impact on other areas of society and may involve ethical considerations (ACSHE120).

People use science understanding and skills in their occupations and these have influenced the development of practices in areas of human activity (ACSHE121)

- *Questioning and Predicting:* Identify questions and problems that can be investigated scientifically and make predictions based on scientific knowledge (ACSIS124)

- *Planning and Conducting*: Collaboratively and individually plan and conduct a range of investigation types, including fieldwork and experiments, ensuring safety and ethical guidelines are followed (AC SIS125)
- *Processing and Analysing Data and Information*: Construct and use a range of representations, including graphs, keys and models to represent and analyse patterns or relationships in data using digital technologies as appropriate (AC SIS129)
- *Communicating*: Communicate ideas, findings and evidence-based solutions to problems using scientific language, and representations, using digital technologies as appropriate (AC SIS133)

# Jobs & industry



**FEARLESS**

# Associated jobs of the future

The skills, knowledge and experience of undertaking this learning experience can equip students for the following jobs of the future.

Teachers can use this engagement tool to help students understand the relevance of this learning to their future world of work.

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## Trendwatcher

Trendwatchers will know what is likely to happen next, and how to make the most of it. They will be employed by big companies and government agencies to watch the latest developments in science, technology, social issues, and the environment. Trendwatchers will be interested in trends across multiple disciplines and areas of human activity. They will have excellent information analysis and synthesis capabilities, and they will be good at horizon-scanning and identifying what might become an opportunity. Their oral and written communication skills will be well-developed.

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## Sharing auditor

Sharing auditors will analyse homes and businesses for assets that can become part of the sharing economy. In the future, where there is a strong emphasis on minimising waste and maximising efficient use of resources, nearly everyone will share some of their belongings. A sharing auditor will visit a home or business and will advise on what people can rent out to others, and which sharing platforms to use. The owner will sign up for a sharing service, and then people will rent items from them. Sharing auditors will have sound judgement and good interpersonal skills. They are analytical, and know about the latest trends in the peer-to-peer sharing economy.

# Links with industry

The Entrepreneurial Education Teacher Practice guide provides a 5-step tool to help teachers identify and integrating meaningful industry and community interactions into the classroom.

1. Establishing collective networks
2. Outreach selection
3. Contact strategies
4. Exposure to the real world of work
5. Reflection and exchange

Note: Use the ETPG tool '5 Steps to guide any classroom to identify and design a simple reciprocally beneficial interaction with industry and community' (Please see [Additional Resources on page 33](#)).

The principal goal of education in the schools should be creating men and women who are capable of doing new things, not simply repeating what other generations have done.

Jean Piaget

Education is the passport to the  
future, for tomorrow belongs to those  
who prepare for it today.

Malcolm X

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