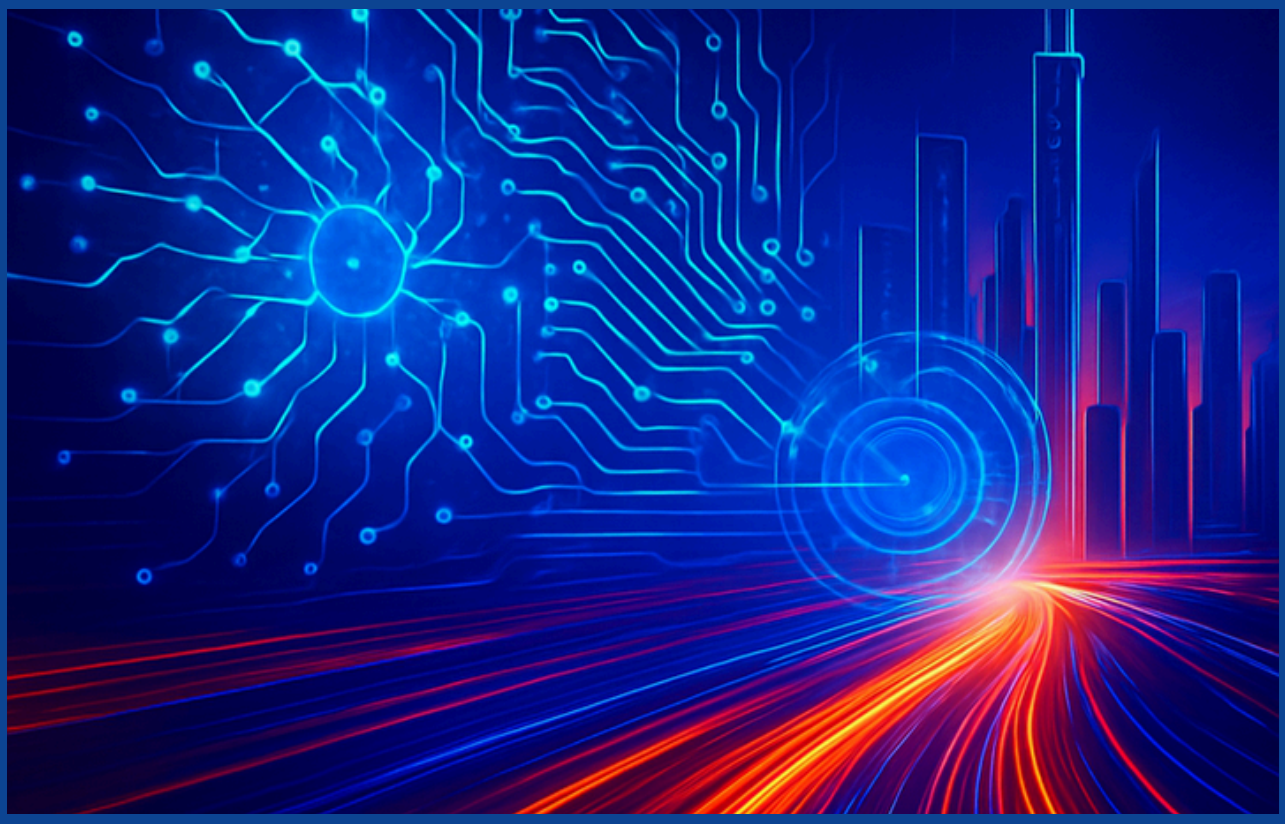
January 2026

The Scaffolded AI Literacy (SAIL) Framework for Education 2.0

Preparing learners at all levels to engage constructively with Artificial Intelligence



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EXECUTIVE SUMMARY

The Scaffolded AI Literacy (SAIL) framework was developed from a Delphi Study of 17 experts in AI from Aotearoa New Zealand and overseas, with representatives from both education and industry, and cultural experts. The first version was published in 2024. After extensive review, this second version of the framework was developed to address the feedback received, and published in 2026.

The framework has four levels of capability. Three define AI literacy, with an additional level that indicates what further capabilities come beyond AI literacy. These levels are not age- or stage-based. Rather, they provide a scaffolded pathway through levels of competency for all learners.

At each level, there are three domains of AI literacy, and each of these is divided into two categories, giving six categories in all. Grouped within these categories, there are 29 competencies scaffolded across each level.

The details of the levels, domains, and categories are provided on the following page. The rest of the document describes each of the four levels in turn, detailing the competencies within each. After discussing the levels individually, it then illustrates how each of the competencies is developed through those levels.

In addition to detailing the SAIL framework, this report provides illustrative examples of learning activities that can be applied at the three main levels of AI literacy, taking into account different learner audiences.

The report also includes information about an online tool that has been developed to help educators evaluate or design course materials that address level 1 of the framework.

The SAIL Framework Contains

3 Domains

of AI literacy

- **AI Concepts**
- **Application of AI and Technical Skills**
- **AI Digital Citizenship**

These are divided into

6 Categories

of AI literacy

- **The Impacts of AI**
- **What AI Is and How It Works**
- **Cognitive Skills**
- **Applied Skills**
- **Social, Cultural, and Ethical Issues**
- **Risks and Mitigations**

And there are

4 Levels

of capability. Three of these are part of the core literacy framework, with level AI++ going beyond literacy to specialist expertise.

1. **Understand and Explore AI**
2. **Apply and Integrate AI**
3. **Evaluate and Create AI**

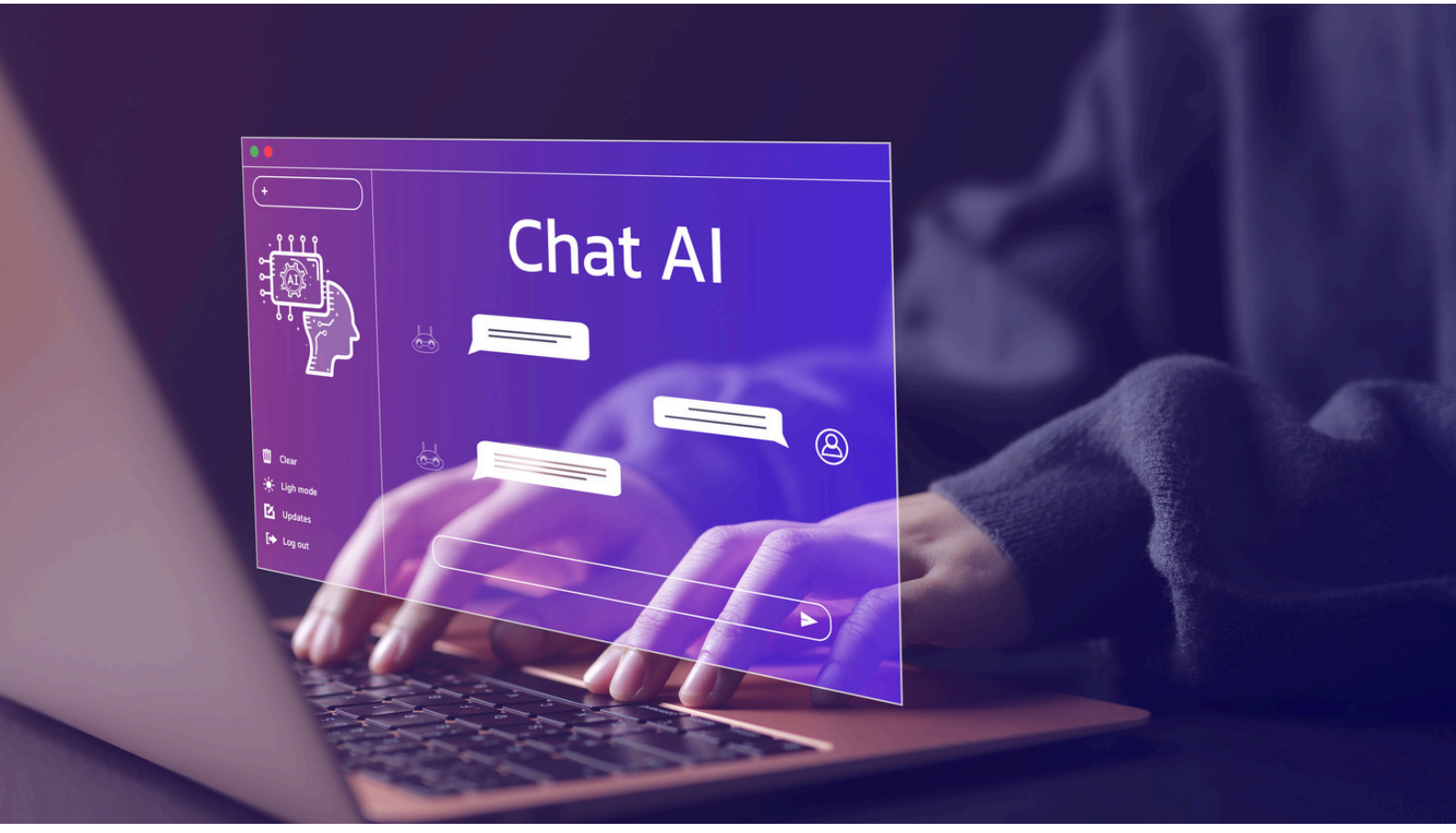
AI++ Transform and Develop AI
(Beyond AI Literacy)

Introduction

With the rapid adoption of Generative Artificial Intelligence (GenAI) tools across many areas of life, the concept of AI Literacy - the set of skills and competencies necessary for everyone to engage constructively with Artificial Intelligence (AI) - is becoming a key focus in education and beyond.

UNESCO (2022) states that everyone should achieve AI literacy, including knowledge, understanding, skills, and values. The World Economic Forum in their 2022 report “Without universal AI literacy, AI will fail us” (WEF, 2022) has promoted the need to foster universal AI literacy and asserts that each of us (students, educators, non-profits, governments, parents, and businesses) needs to become literate about AI, to know when it is being used, and be able to evaluate its benefits and limitations in our lives. As AI continues to permeate society, it becomes increasingly essential for individuals to possess a foundational understanding of AI concepts, functionalities, and implications. AI literacy equips people with the skills to critically engage with AI systems, fostering informed decision-making and ethical awareness.

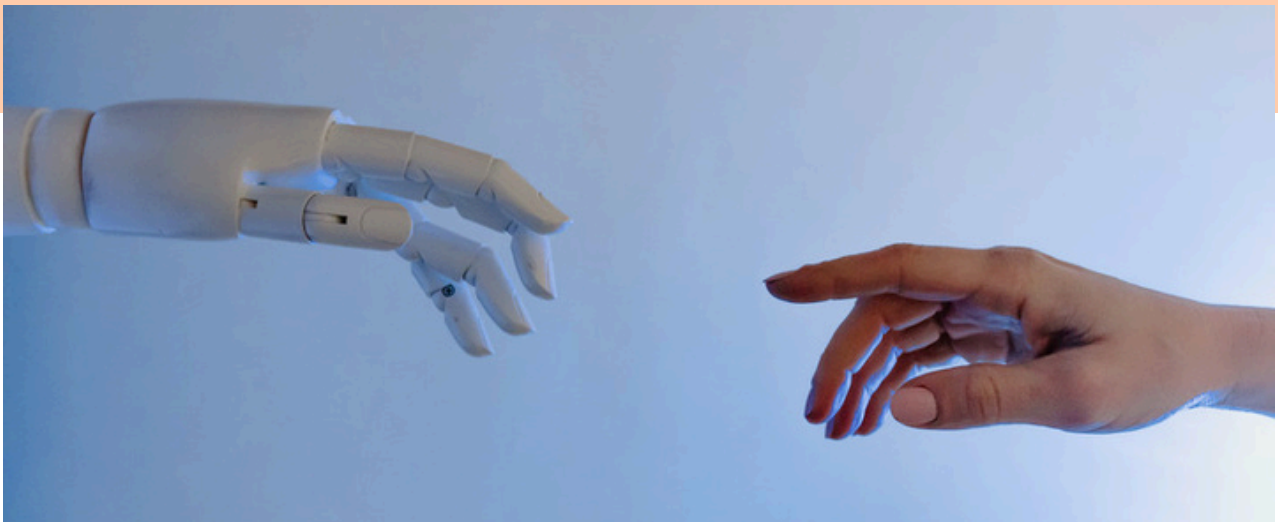
This updated report describes the second release of the Scaffolded AI Literacy (SAIL) framework, intended to support equitable, accessible, and effective education in the age of AI. Using this framework can empower individuals across all demographics to navigate and contribute to an AI-driven world, ensuring they are not just passive consumers but active participants in shaping how this technology is used and created.



AI Literacy

AI literacy has become a major force across the education sector. As AI technologies become increasingly ubiquitous, educators and learners alike must understand the fundamental principles of how these systems work, their potential biases and limitations, and the ethical considerations surrounding their use (Faruqe et al., 2022). Without this critical understanding, learners may struggle to effectively and responsibly leverage AI in their studies and future careers. Developing learners' AI literacy should, therefore, be a key priority for all areas of education, from primary to tertiary.

Emerging from previous work about the role of AI in education, AI literacy was first discussed around 2016 when Konishi conceptualised it as being able to recognise tasks that can be performed by AI, and learning and investing in the human strengths that it cannot replace. In contrast, Kandlhofer et al. (2016) took a more technical view, emphasising the techniques and concepts behind AI products and services. Since then, many others have suggested further definitions of AI literacy. One source that is commonly referred to is Long and Magerko's (2020) five AI literacy themes, which are based on other literature and linked to a set of competencies and design considerations. However, in the domain of AI literacy research, although many different perspectives have been explored, only a few have addressed the design of scaffolded frameworks that navigate through levels of learning. The SAIL framework contributes to this wider work.



The Need for an AI Literacy Framework

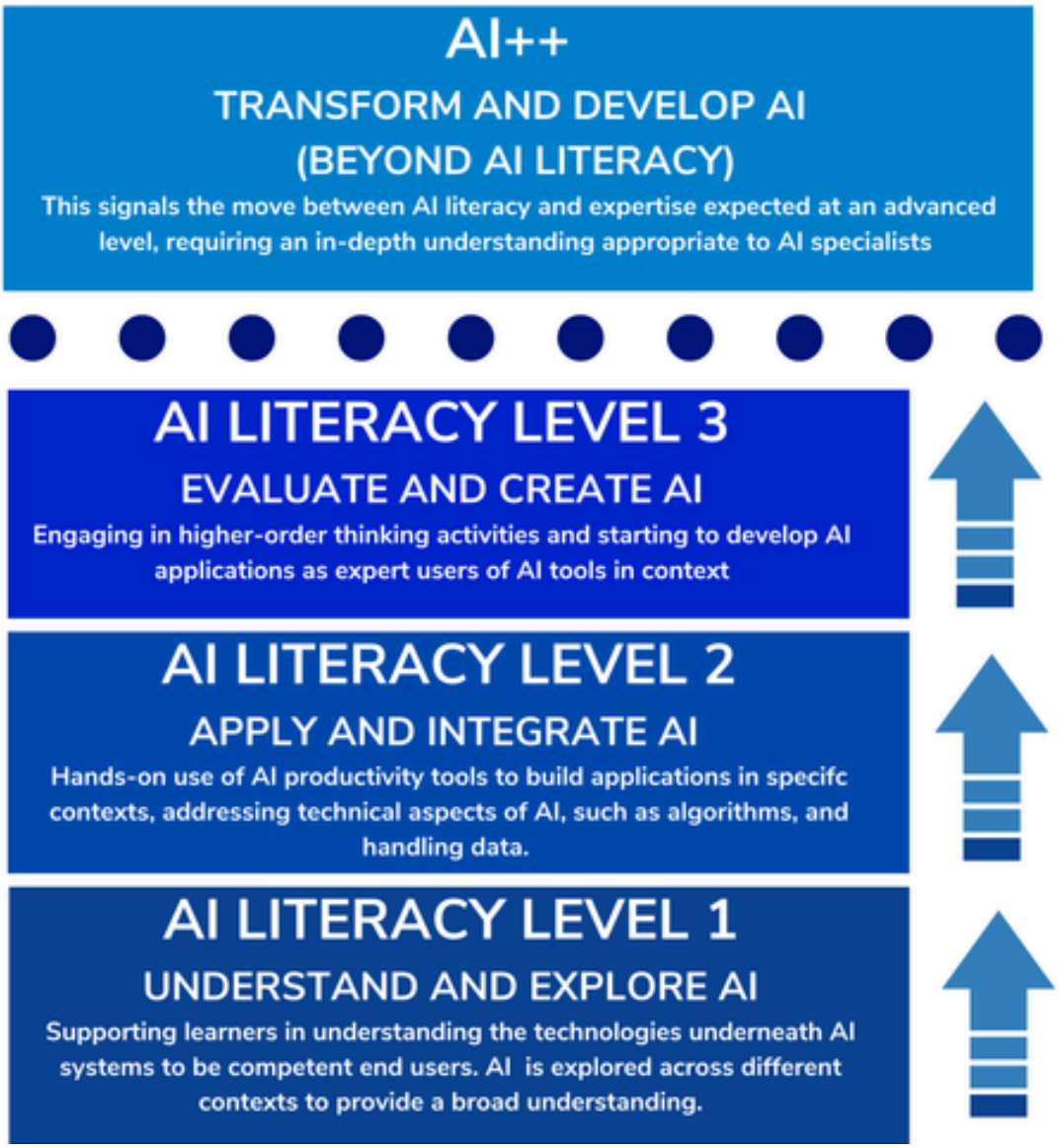
The first step towards AI Literacy is to identify what knowledge, skills, awareness, and understanding are necessary to use, benefit from, and create with, AI tools. This, however, is not enough to help develop the necessary skills and competencies. The various dimensions of AI literacy need to be organised into a suitable framework that provides a guide for learning and development. The purpose of an AI literacy framework is, therefore, to provide a structured approach to understanding and engaging with AI technologies.

The SAIL framework serves as a guide for educators, policymakers, and learners, outlining the key competencies and knowledge areas necessary to navigate the complexities of AI. It encompasses fundamental concepts such as machine learning, data privacy, and potential bias, as well as cognitive skills like critical thinking and ethical reasoning. By integrating these essential components, the framework aims to foster a comprehensive understanding of AI, enabling individuals to responsibly and effectively apply AI tools in various contexts. It also seeks to democratise access to AI in education, ensuring that all learners, regardless of background, have the opportunity to become literate in AI. Ultimately, the AI literacy framework is designed to prepare individuals for a future where AI is ubiquitous, empowering them to leverage AI for personal, professional, and societal benefit.

The Four Levels of the SAIL Framework

From Understand and Explore to Beyond AI Literacy

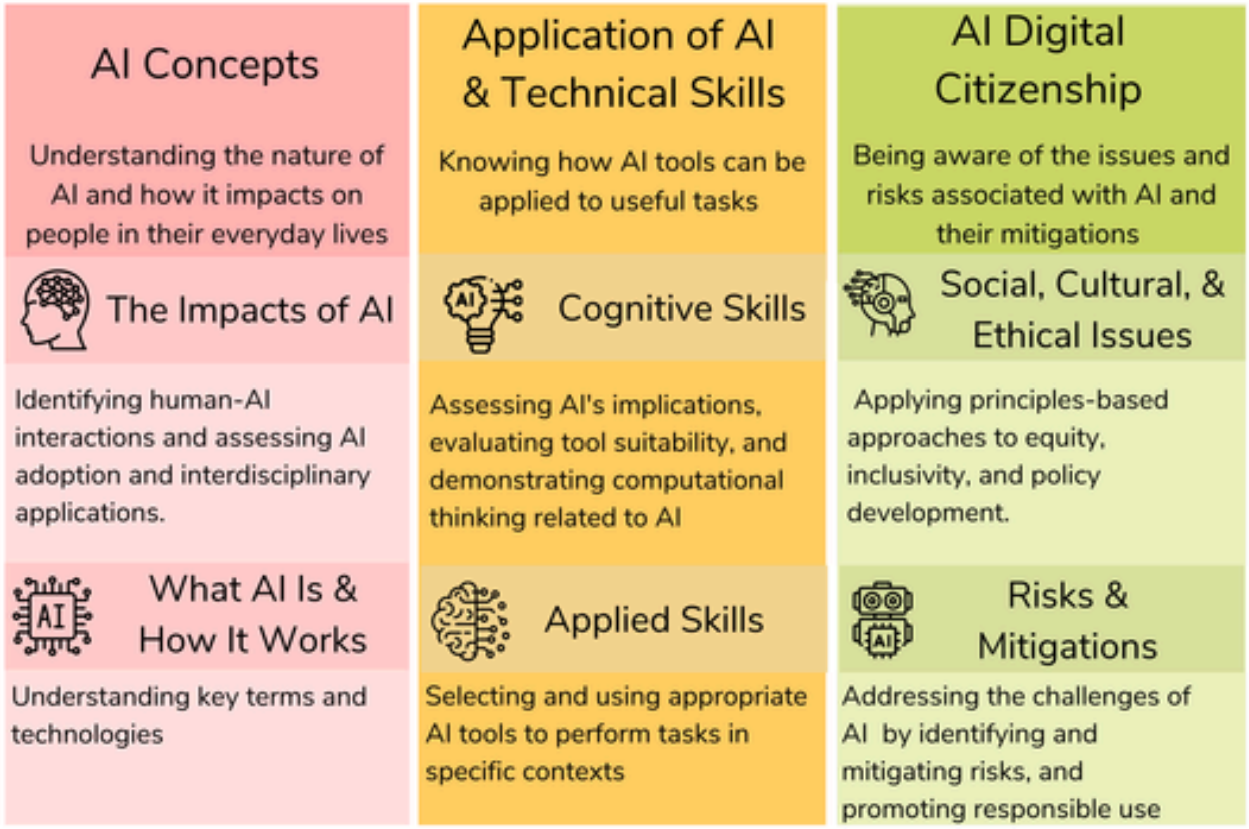
The figure below shows the four capability levels of the framework. These levels show the levels a learner would move through to build their AI literacy, with the final stage (transform and develop AI) representing the move towards specialist AI fluency, where learners move from literacy to deeper engagement - to the knowledge needed for those moving into AI fields of research and practice. It is also important to highlight that this framework was developed to be age-agnostic. While the higher levels (3 and AI++) would be more suited to older learners, different levels can be taught across different sectors (early years and beyond) with teaching adapted to suit different age levels and contexts.



The Scaffolded AI Literacy (SAIL) Framework for Education

The Domains and Categories of the Framework

The six categories of the framework are divided into three domains of AI literacy: AI concepts, application of AI and technical skills, and AI digital citizenship. These six categories together ensure that there is an appropriate mix of knowledge, skills, and critical thinking. Each category is represented in each level, with learners developing further related capabilities in each domain as they progress up the levels.

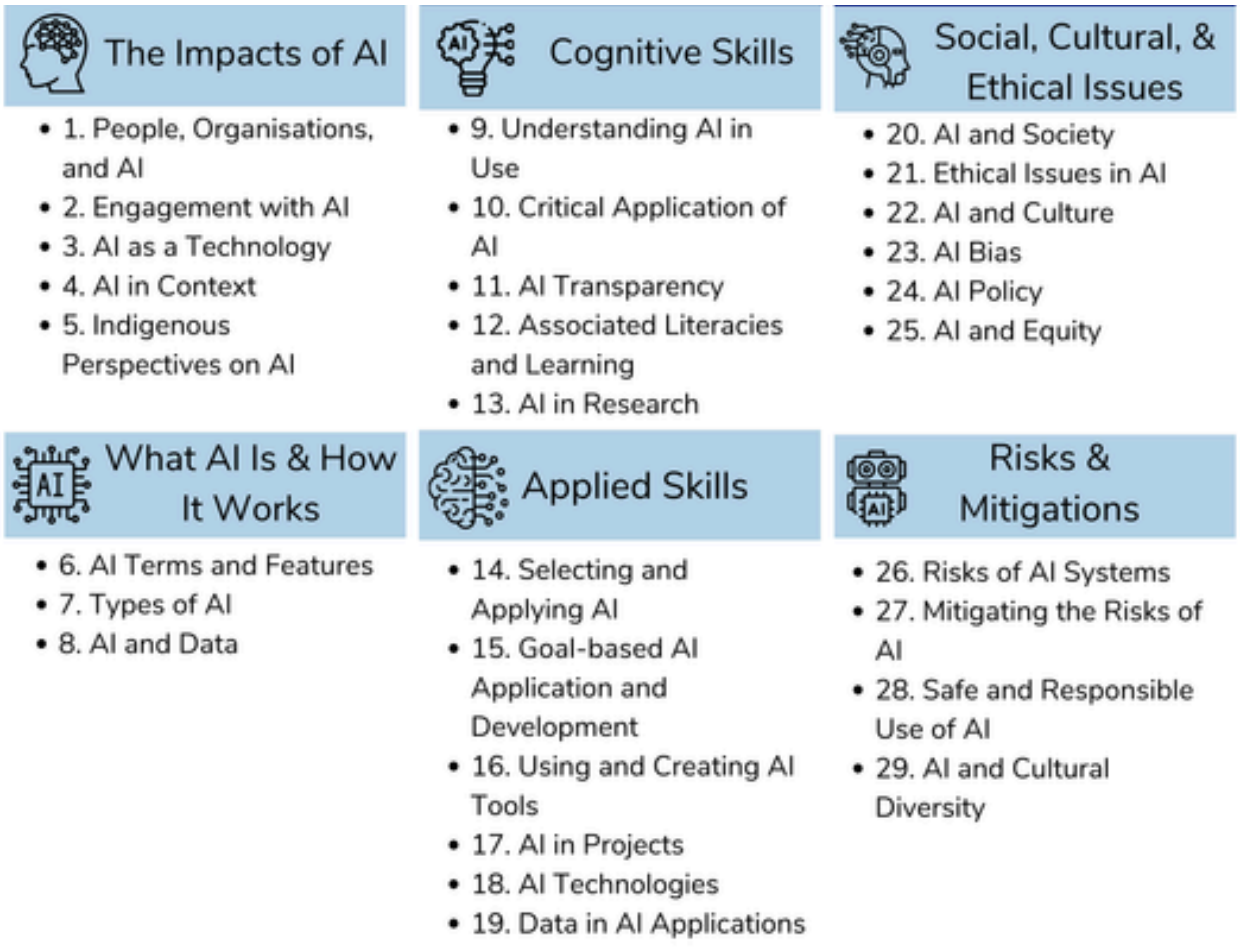


The Scaffolded AI Literacy (SAIL) Framework for Education

The Key Ideas of the Framework

Each category includes between three and six key ideas, with 29 in total.

Each key idea relates to one competency at each of the four levels. These were introduced into the framework to make it easier to see how related competencies are scaffolded across all of the four levels.



Level 1 - Understand and Explore AI

The first level of the framework provides the foundational level of AI literacy for everyone. How and when these literacies might be developed will vary across learners and contexts and may be developed in different sequences and at different depths. For example, educators working with older or more experienced learners may be able to explore these same competencies using different approaches than those working with younger or less experienced learners. This concept is explored in the subsequent examples of applying AI tools in learning contexts.

AI Concepts

The Impacts of AI

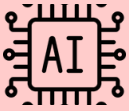
1. People, Organisations, and AI
- Recognise critical issues in the relationship between people and AI (bias, hallucinations, uncritical use).

2. Engagement with AI
- Identify how people are using AI in daily life; give examples of sector impacts.

3. AI as a Technology
- Explain basic concepts of AI and distinguish AI from other technologies.

4. AI in Context
- Give examples of how AI has impacted different sectors.

5. Indigenous Perspectives on AI
- Recognise Indigenous knowledge, worldviews and values in relation to technology.



What AI Is and How It Works

6. AI Terms and Features
- Define and recognise common AI terms and features.

7. Types of AI
- Identify what is, and is not, AI; describe basic categories (rule-based vs. machine learning, generative vs. discriminative).

8. AI and Data
- Explain the role of data in AI systems, using simple examples.

Level 1 - Understand and Explore AI

Application of AI and Technical Skills

Cognitive Skills

9. Understanding AI in Use
- Identify features of AI and describe their applications and interactions.

10. Critical Application of AI
- Recognise situations where using AI may or may not be appropriate.

11. AI Transparency
- Demonstrate awareness of AI inaccuracies and simple checking strategies.

12. Associated Literacies and learning
- Integrate AI literacy into broader digital literacies, considering how equity issues in AI literacy can be supported (recognising differences in access to technology, skills, and learning opportunities).

13. AI in research
- Apply and evaluate how AI can support simple research practices (such as literature reviews).

Applied Skills

14. Selecting and Applying AI
- Select and apply simple AI tools for specific tasks.

15. Goal-based AI Application and Development
- Apply AI tools to achieve personal, learning, or work goals.

16. Using and Creating AI Tools
- Use AI tools to support simple tasks and reflect on their outputs.

17. AI in Projects
- Recognise examples of AI projects and their purposes.

18. AI Technologies
- Recognise different AI technologies (ML, NLP, CV, etc.).

19. Data in AI Applications
- Recognise that AI systems depend on data and identify examples of data used in everyday AI applications.

Level 1 - Understand and Explore AI

AI Digital Citizenship

Social, Cultural, and Ethical Issues

20. AI and Society
- Recognise potential benefits and challenges of AI in society.

21. Ethical issues in AI
- Identify common ethical concerns in AI (e.g., bias, fairness, transparency).

22. AI and Culture
- Explain AI's relationship with culture and values.

23. AI Bias
- Explain how bias occurs in AI systems.

24. AI Policy
- Recognise that AI requires governance and oversight.

25. AI and Equity
- Recognise that AI can create unequal impacts for different groups.

Risks and Mitigations

26. Risks of AI Systems
- Identify risks presented by AI systems (e.g., privacy, security, fraud, misuse).

27. Mitigating the Risks of AI
- Recognise and describe simple ways to mitigate risks presented by AI systems (e.g., safe passwords, privacy settings).

28. Safe and Responsible Use of AI
- Demonstrate responsible behaviours when using AI tools, recognising potential misuse.

29. AI and Cultural Diversity
- Discuss the impact of AI on cultural diversity and identify risks of cultural bias.

The Scaffolded AI Literacy (SAIL) Framework for Education

Applied AI Example for Level 1

Google's Quick, Draw! (https://quickdraw.withgoogle.com/)

Quick, Draw! provides real-time feedback as you draw on the screen. It is a fun and interactive way to introduce students to AI concepts. It uses a neural network to recognise drawings in real time, providing an engaging experience for learners. Students can see how good the neural network is at recognising their drawings. It also makes its data set publicly available, meaning that other researchers can use the data to train their own neural networks.

The following are some example concepts that could be covered using this tool:

Young Children

Young children can engage with the tool by drawing simple objects and seeing if the AI can recognise them. They can discuss how the AI 'learns' from millions of drawings to identify new ones, and understand that AI uses patterns in data to make decisions and recognise objects.

Older students

Older students can explore the app's dataset and discuss the importance of diverse data in training AI and the bias that can occur. They can also explore issues like what happens if the dataset lacks variety in styles or cultures and how this could be designed to avoid these limitations.

Adult Learners

Adult learners can use the tool to get a hands-on example of how neural networks function. It could be used to help learners consider the implications of using AI in various contexts, such as education, healthcare, and more, and explore the deeper ethical issues of design in more depth.

The Scaffolded AI Literacy (SAIL) Framework for Education

Mapping the Example to Level 1 of the Framework

6. AI Terms and Features

Define and Recognise common AI terms and features

This hands-on example of a neural network helps explain how AI can be used to recognise patterns and interpret user inputs. It can introduce key terms such as dataset, bias, training data and Natural Language Processing.

Learners can see the actual data that has been input into the system and even help improve the dataset by flagging drawings that are not correct, therefore improving the system.

8. AI and Data

Explain the role of data in AI systems, using simple examples

9. Understanding AI in Use

Identify features of AI and describe their applications and interactions

The tool can help introduce the different ways users can interact with AI - in this case, via drawings - and how it can be applied - in this case to identify what has been drawn.

Students can explore how the application uses data input by users to support its object recognition and discuss where image recognition is used in other systems (e.g. face recognition on a phone)

19. Data in AI Applications

Recognise that AI systems depend on data and identify examples of data used in everyday applications

16. Using and Creating AI Tools

Use AI tools to support simple tasks and reflect on their outputs

Students can assess how Quick, Draw!'s technology can be used by also comparing it to Autodraw (https://www.autodraw.com/) and reflecting on how the learning from one informs the other

Discussions can be held on the ethical implications of AI, including how a system that uses visual data might be biased, unfair, or work in a non-transparent way

21. Ethical Issues in AI

Identify common ethical concerns in AI (e.g., bias, fairness, transparency)

Relevant Readings:

- Fernandez-Fernandez, R.,et al. (2019). Quick, stat!: A statistical analysis of the quick, draw! dataset. arXiv preprint arXiv:1907.06417.
- Su, J., & Yang, W. (2023). Artificial Intelligence (AI) literacy in early childhood education: an intervention study in Hong Kong. Interactive Learning Environments

Sample Resource:

A slide set using Quick, Draw! to introduce young children to the basic concepts of AI and introduce simple ideas abou data and issues around bias. It could be adapted for different ages.

Slide Link

Level 2 - Apply and Integrate AI

The second level of the framework provides a more active approach to AI literacy. Building on the foundational skills of level 1, it provides the learner with a pathway to become directly involved in the use and application of AI tools and engage more critically in the wider issues around AI technologies.

AI Concepts

The Impacts of AI

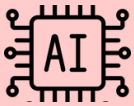
1. People, Organisations, and AI
- Discuss how AI systems address the needs of people and organisations.

2. Engagement with AI
- Discuss the opportunities and risks of AI adoption in specific contexts and how access to AI technologies impacts participation in education, work, and civic life.

3. AI as a Technology
- Understand how algorithms work and how they are used in AI tools and applications.

4. AI in Context
- Demonstrate an understanding of AI's role in a specific situation.

5. Indigenous Perspectives on AI
- Describe how AI can support indigenous aspirations in education, health, and cultural preservation.



What AI Is and How It Works

6. AI Terms and Features
- Apply terms to explain how AI models are trained, including steps such as input, training, and outputs.

7. Types of AI
- Compare the main features of different AI approaches.

8. AI and Data
- Identify and discuss different data sources, including issues of quality, bias, and representativeness.

Level 2 - Apply and Integrate AI

Application of AI and Technical Skills

Cognitive Skills

9. Understanding AI in Use
- Explain how AI influences tasks, work, and systems.

10. Critical Application of AI
- Discuss how AI can support decision-making and problem-solving.

11. AI Transparency
- Discuss transparency and explainability in AI, and why they matter.

12. Associated Literacies and Learning
- Demonstrate computational thinking skills relevant to AI.

13. AI in Research
- Explore and discuss AI research outputs and implications.

Applied Skills

14. Selecting and Applying AI
- Determine which AI methods/tools best fit different problems or contexts.

15. Goal-based AI Application and Development
- Apply AI tools across different fields of study or disciplines and create simple AI applications that promote equitable outcomes.

16. Using and Creating AI Tools
- Use, adapt and/or combine AI tools to create basic applications.

17. AI in Projects
- Contribute to simple AI projects using basic tools or datasets.

18. AI Technologies
- Explain core machine learning approaches and their applications.

19. Data in AI Applications
- Explain how datasets (including training and testing sets) are used and transformed to create AI models, and how they must respect Indigenous data sovereignty and cultural protocols.

Level 2 - Apply and Integrate AI

AI Digital Citizenship

Social, Cultural, and Ethical Issues

20. AI and Society
- Explore the impact of AI on societal norms, work, creativity, and participation.

21. Ethical Issues in AI
- Provide examples of ethical issues across AI use cases, recognising the role of cultural frameworks in shaping ethical AI use.

22. AI and Culture
- Explore the impact of AI on Indigenous and disadvantaged groups.

23. AI Bias
- Evaluate how data quality and sources shape bias in models.

24. AI Policy
- Describe examples of AI policies/regulations in practice.

25. AI and Equity
- Explore how AI access and use vary across socio-economic, cultural, and geographic contexts.

Risks and Mitigations

26. Risks of AI Systems
- Assess risks related to data use in AI, including accuracy, relevance, storage, and potential misuse.

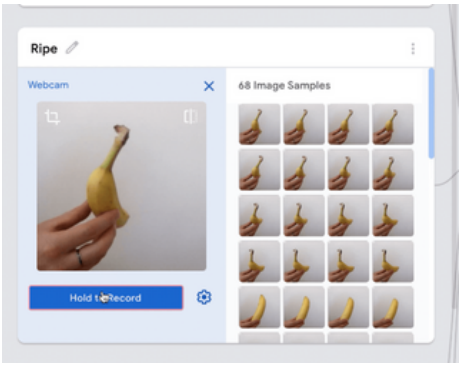
27. Mitigating the Risks of AI
- Apply strategies to protect personal rights and privacy when interacting with AI (e.g., consent, data-sharing policies).

28. Safe and Responsible Use of AI
- Apply ethical frameworks to evaluate AI's impact on individuals and society, considering fairness and justice.

29. AI and Cultural Diversity
- Recognise how AI can impact minority cultures, including Māori and Pacific peoples, and apply principles of Indigenous data sovereignty.

The Scaffolded AI Literacy (SAIL) Framework for Education

Applied AI Example for Level 2



Google's Teachable Machine (https://teachablemachine.withgoogle.com/)

Google's Teachable Machine is a user-friendly platform that allows individuals to train machine learning (ML) models without any prior coding knowledge. By allowing learners to create image, sound, and pose detection models through a simple, interactive interface, Teachable Machine provides a practical introduction to machine learning concepts. This hands-on experience helps demystify AI, making it accessible and engaging.

Young Children

Supported by the teacher, young children can be guided in designing simple activities to train models to recognise different objects or their own drawings. This can help children understand the basics of categorisation and pattern recognition in a fun way.

Older students

Older children can explore the mechanics of AI and machine learning through the integration of basic coding and more sophisticated projects and concepts. The versatility of the platform allows for the integration of many different projects suitable for older students to explore AI concepts.

Adult Learners

The platform provides an accessible way to teach the basics of machine learning classification in a way that would be relevant to adult learners. Through hands-on activities, it provides a scaffolded way to learn about supervised learning and explain concepts of bias without students needing to be able to program, so it would be good for a wider range of learners who don't necessarily have programming skills. Data models can also be exported to create more advanced projects suitable for scaffolding into higher levels.

The Scaffolded AI Literacy (SAIL) Framework for Education

Mapping the Example to Level 2 of the Framework

23. AI Bias

Evaluate how data quality and sources shape bias in models

Teachable Machine allows users to create their own datasets, which can then be used to train models. By intentionally or unintentionally including biased data, users can observe how the model's performance is affected, highlighting the importance of diverse and representative data.

20. AI and Society

Explore the impact of AI on societal norms, work, creativity, and participation

Educators can use the outcomes from Teachable Machine projects, which demonstrate the capabilities of machine learning, as case studies for classroom debates on the broader social impacts of AI. This encourages critical thinking and ethical reasoning.

24. AI Policy

Describe examples of AI policies/regulations in practice

Facilitators can introduce ethical guidelines and principles (such as those proposed by UNESCO, 2021) and have learners assess their Teachable Machine projects against these standards.

16. Using and Creating AI Tools

Use, adapt and/or combine AI tools to create basic applications

By creating and testing their own machine learning models, students gain practical experience in the AI development lifecycle, from data collection to model training and evaluation.

6. AI Terms and Features

Apply terms to explain how AI models are trained, including input, training, and output

Working with an AI tool like Teachable Machine, students can gain firsthand experience of the input, training, and output of a machine learning model.

18. AI Technologies

Explain core machine learning approaches and their applications

Building on the labeled data approach used with Teachable Machine, educators can emphasise the critical role of data in each machine learning approach, discussing how different types of data (labeled, unlabeled, reward signals) drive the learning process.

Relevant Readings:

- Dwivedi, U., Elsayed-Ali, S., Bonsignore, E., & Kacorri, H. (2024). Exploring AI Problem Formulation with Children via Teachable Machines. CHI '24
- Carney, M. (2019). Using Teachable Machine in the d.school classroom. Medium.
- Payne, B. H. (2019). An ethics of artificial intelligence curriculum for middle school students. MIT Media Lab.

Sample Resource:

A set of lessons created by MIT to teach middle school students about AI ethics, to help them become more conscientious consumers and future designers of AI. Examples include how Teachable Machine can be used to teach students about supervised machine learning. While targeted at middle school, the resources can be adapted for any age.

Resource Link

Level 3 - Evaluate and Create AI

This level of the framework provides the highest level of knowledge skill, and competency within the scope of AI literacy.

AI Concepts

The Impacts of AI

1. People, Organisations, and AI

- Discuss the role of people and organisations in the development and deployment of AI.

2. Engagement with AI

- Evaluate current and potential uses/harms across disciplines; Analyse how global inequities shape who builds AI and who bears the risks.

3. AI as a Technology

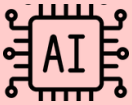
- Evaluate AI models, including fairness across populations; create design principles for AI in context.

4. AI in Context

- Demonstrate an understanding of the role of AI across interdisciplinary fields.

5. Indigenous Perspectives on AI

- Critically evaluate AI systems for alignment with Indigenous data sovereignty and Pacific cultural frameworks.



What AI Is and How It Works

6. AI Terms and Features

- Evaluate how deep learning and other architectures shape model capabilities and limitations.

7. Types of AI

- Evaluate the strengths, limitations, and application contexts of different AI systems.

8. AI and Data

- Evaluate how AI systems address problems, how their algorithms are developed, and how they learn patterns from large datasets.

Level 3 - Evaluate and Create AI

Application of AI and Technical Skills

Cognitive Skills

9. Understanding AI in Use

- Evaluate how AI adoption may impact workers differently across industries, focusing on the benefits and mitigating limitations, supporting equity and redistribution of benefits.

10. Critical Application of AI

- Evaluate the suitability and usefulness of AI technologies for tasks.

11. AI Transparency

- Evaluate approaches to enhance transparency, explainability, and accountability in AI.

12. Associated Literacies and Learning

- Demonstrate data literacy, including privacy, management, and governance.

13. AI in Research

- Learn and apply new AI concepts, tools, and techniques independently.

Applied Skills

14. Selecting and Applying AI

- Evaluate and implement creative approaches to AI applications across contexts.

15. Goal-based AI Application and Development

- Develop AI projects using scripts, tools, and libraries.

16. Using and Creating AI tools

- Apply the steps in AI model development (training, testing, validation, deployment).

17. AI in Projects

- Assess how human-centred and culturally grounded design principles affect AI projects.

18. AI Technologies

- Evaluate how algorithms and data underpin approaches to AI, and their suitability.

19. Data in AI Applications

- Process and manage data for AI applications using appropriate tools (e.g., cleaning, preparation, validation).

Level 3 - Evaluate and Create AI

AI Digital Citizenship

Social, Cultural, and Ethical Issues

Risks and Mitigations

20. AI and Society
- Critically analyse approaches to mitigate societal/ethical risks.

21. Ethical Issues in AI
- Evaluate ethical challenges in AI design and implementation.

22. AI and Culture
- Analyse how AI design decisions may reinforce or disrupt structural inequities (e.g., racism, sexism, class bias).

23. AI Bias
- Analyse the impacts of bias and propose strategies for diverse datasets.

24. AI Policy
- Discuss the role of AI policy and governance, including how it reflects obligations to Indigenous rights (such as those under Te Tiriti).

25. AI and Equity
- Critically evaluate AI systems for equity, fairness, and accessibility.

26. Risks of AI Systems
- Evaluate current risks of AI implementation, including human–AI interaction, intellectual property, and societal impacts.

27. Mitigating the Risks of AI
- Implement strategies to enhance safety, security, and reliability of AI systems, ensuring ethical data collection and management.

28. Safe and Responsible Use of AI
- Use a critical mindset to question assumptions and limitations of AI tools.

29. AI and Cultural Diversity
- Advocate for inclusive AI applications by addressing diverse user needs and avoiding discriminatory impacts.

The Scaffolded AI Literacy (SAIL) Framework for Education

Applied AI Example for Level 3

Machine Learning for Kids
(https://machinelearningforkids.co.uk/)

Machine Learning for Kids is a platform that allows students to create and train their own machine learning models through a user-friendly interface. It provides hands-on experience with various types of AI projects, helping learners understand core concepts of machine learning.

Older students

As the platform includes examples that use scripting languages (Python), this provides more challenging options for older students. More complex projects, such as creating chatbots or games, provide opportunities for diversity, exploring a range of machine learning models, experimenting with various datasets, and discussing important topics like data bias and the ethical implications of AI.

Young Children

As the focus of the platform is to teach machine learning concepts using programming, this may only be relevant for children in upper primary, who have some programming skills. However, a range of projects could be used for younger children, but integrated in a more structured manner than would be needed for older learners.

Adult Learners

Although the platform is designed for children, the activities are still valid for adult learners. As they include block-based approaches, they can be used by learners who are not yet proficient with programming. Adapting these examples to address broader and more discursive topics will help them be more applicable to older learners. They can be used to develop critical understandings of the potential applications and limitations of AI in real-world contexts.

The Scaffolded AI Literacy (SAIL) Framework for Education

15. Goal-Based AI Application and Development

Develop AI projects using scripts, tools, and libraries

Students create multiple versions of a model using Machine Learning for Kids, intentionally introducing various biases or limitations. They then test the performance of these models under different conditions to understand the importance of diverse, representative training data.

4. AI in Context

Demonstrate an understanding of the role of AI across interdisciplinary fields

Learners explore potential misuse of their AI models created on Machine Learning for Kids and develop strategies to ensure responsible use. They critically analyse their projects, question assumptions, and discuss future AI developments based on their hands-on experience with the platform.

4. Selecting and Applying AI

Evaluate and implement creative approaches to AI applications across contexts.

Students evaluate the ethical implications of their Machine Learning for Kids projects, considering issues like fairness, transparency, and potential biases. They assess how their AI models might impact different social and cultural groups and propose strategies to address ethical concerns.

Mapping the Example to Level 3 of the Framework

Students use Machine Learning for Kids to create a complex project that combines multiple AI models (e.g., image recognition and text classification) to solve a multifaceted problem. They could design an interactive story where the plot changes based on both visual input and text responses.

16. Using and Creating AI tools

Apply the steps in AI model development (training, testing, validation, deployment).

Learners use Machine Learning for Kids to create a project that addresses a real-world issue by combining AI with another subject area. For instance, they might develop an environmental monitoring tool that uses image recognition to identify and classify pollutants.

26. Risks of AI Systems

Evaluate current risks of AI implementation, including human–AI interaction, intellectual property, and societal impacts

Learners use the platform to create and implement creative AI projects across various contexts. They develop AI applications using appropriate tools within Machine Learning for Kids, effectively presenting their projects and communicating results through data visualisations.

25. AI and Equity

Critically evaluate AI systems for equity, fairness, and accessibility

Relevant Readings:

- Fahrudin, T. M. (2020). An Introduction To Machine Learning Games And Its Application For Kids In Fun Project. IJCONSIST
- Sunarya, P. A. (2022). Machine learning and artificial intelligence as educational games. International Transactions on Artificial Intelligence,
- Pacheco, et al. (2023) Machine Learning Tool for Kids: A Contribution to Teaching Computational Thinking in Schools.

Sample Resource:

Machine Learning for Kids includes a huge range of projects that can be adapted into the classroom. These resources include downloadable step-by-step guides, with explanations and colour screenshots for students to follow.

Resource Link

Level AI++ - Transform and Develop AI (Beyond AI Literacy)

Level AI++ suggests what comes beyond literacy. This level signals the move beyond literacy and towards a deeper engagement with AI. These capabilities would be expected of learners that are specialising in research or practice with a focus on AI.

AI Concepts

The Impacts of AI

1. People, Organisations, and AI

- Design and implement AI strategies to lead ethical governance and contribute to shaping AI policy/standards.

2. Engagement with AI

- Explore implications of future AI technologies and state-of-the-art developments.

3. AI as a Technology

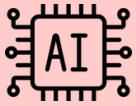
- Analyse the impact of advanced computing concepts and future technical directions.

4. AI in Context

- Demonstrate an understanding of the state-of-the-art in AI and its future directions, addressing the benefits and potential risks.

5. Indigenous Perspectives on AI

- Co-develop AI initiatives in partnership with Indigenous communities, embedding relevant cultural principles in governance and design.



What AI Is and How It Works

6. AI Terms and Features

- Demonstrate mastery of advanced AI concepts and apply them to novel or domain-specific systems.

7. Types of AI

- Design or adapt AI solutions that leverage appropriate system types for specific domains or problems.

8. AI and Data

- Apply advanced data practices in the development or adaptation of AI systems.

The Scaffolded AI Literacy (SAIL) Framework for Education

Level AI++ - Transform and Develop AI (Beyond AI Literacy)

Application of AI and Technical Skills

Cognitive Skills

Applied Skills

9. Understanding AI in Use
- Design and evaluate end-to-end AI processes (from data to lifecycle management).

10. Critical Application of AI
- Explore and critique emerging research directions in AI.

11. AI Transparency
- Apply ethical considerations such as transparency, explainability, and fairness to AI practice/governance.

12. Associated Literacies and Learning
- Sustain continual learning in ethical, societal, and technological aspects of AI.

13. AI in Research
- Contribute to AI research through exploration, hypothesis generation, and scholarly engagement, ensuring knowledge creation respects cultural values.

14. Selecting and Applying AI
- Design and deliver AI projects with measurable outcomes, analysing and reporting findings.

15. Goal-based AI Application and Development
- Build real-world AI applications leveraging advanced programming and AI techniques.

16. Using and Creating AI tools
- Design, implement, fine-tune, and troubleshoot advanced AI models using frameworks.

17. AI in Projects
- Manage and lead AI projects, collaborating with teams and applying coding/software expertise.

18. AI Technologies
- Apply AI frameworks and principles to complex problem-solving.

19. Data in AI Applications
- Design and implement data pipelines, including integration, feature engineering, and optimisation for AI systems.

Level AI++ - Transform and Develop AI (Beyond AI Literacy)

AI Digital Citizenship

Social, Cultural, and Ethical Issues

20. AI and Society
- Anticipate future AI directions and lead inclusive AI design that embeds Indigenous worldviews, ensuring culturally sustaining and just outcomes.

21. Ethical Issues in AI
- Apply and test principles-based frameworks in practice.

22. AI and Culture
- Lead inclusive AI development that respects cultural values.

23. AI Bias
- Demonstrate and critique deliberate bias to raise ethical awareness.

24. AI Policy
- Contribute to policy and guideline development for ethical AI and respect Indigenous sovereignty and minority rights.

25. AI and Equity
- Lead AI initiatives that promote equity, social justice, and inclusive design.

Risks and Mitigations

26. Risks of AI Systems
- Anticipate and analyse future risks of AI (e.g., advanced cybersecurity threats, malicious use), balancing benefits against potential harms.

27. Mitigating the Risks of AI
- Design and embed safeguards into AI systems to mitigate psychological, societal, and security risks across diverse contexts

28. Safe and Responsible Use of AI
- Demonstrate a safety-first, equitable and accessible approach in AI development, taking responsibility for system impacts and long-term consequences.

29. AI and Cultural Diversity
- Lead the design and implementation of inclusive AI systems that respect cultural diversity and social justice.

The Scaffolded AI Literacy (SAIL) Framework for Education

Competencies Across the Four Literacy Levels

The previous sections have worked through each of the four levels of the framework in turn, but addressed each of them in isolation.

To understand how the SAIL framework scaffolds AI literacy competencies, it is also necessary to show how each of the 29 key ideas is developed from level 1 to level AI++.

The following pages show each category in turn, with the four levels of competency from each key idea grouped together to show how the competencies progress.

3 Domains	6 Categories	29 Key Ideas	4 Levels 116 Competencies	
			1. People, Organisations, and AI	☑ ☑ ☑ ☑
			2. Engagement with AI	☑ ☑ ☑ ☑
			3. AI as a Technology	☑ ☑ ☑ ☑
			4. AI in Context	☑ ☑ ☑ ☑
			5. Indigenous Perspectives on AI	☑ ☑ ☑ ☑
			6. AI Terms and Features	☑ ☑ ☑ ☑
			7. Types of AI	☑ ☑ ☑ ☑
			8. AI and Data	☑ ☑ ☑ ☑
			9. Understanding AI in Use	☑ ☑ ☑ ☑
			10. Critical Application of AI	☑ ☑ ☑ ☑
			11. AI Transparency	☑ ☑ ☑ ☑
			12. Associated Literacies and Learning	☑ ☑ ☑ ☑
			13. AI in Research	☑ ☑ ☑ ☑
			14. Selecting and Applying AI	☑ ☑ ☑ ☑
			15. Goal-based AI Application and Development	☑ ☑ ☑ ☑
			16. Using and Creating AI Tools	☑ ☑ ☑ ☑
			17. AI in Projects	☑ ☑ ☑ ☑
			18. AI Technologies	☑ ☑ ☑ ☑
			19. Data in AI Applications	☑ ☑ ☑ ☑
			20. AI and Society	☑ ☑ ☑ ☑
			21. Ethical Issues in AI	☑ ☑ ☑ ☑
			22. AI and Culture	☑ ☑ ☑ ☑
			23. AI Bias	☑ ☑ ☑ ☑
			24. AI Policy	☑ ☑ ☑ ☑
			25. AI and Equity	☑ ☑ ☑ ☑
			26. Risks of AI Systems	☑ ☑ ☑ ☑
			27. Mitigating the Risks of AI	☑ ☑ ☑ ☑
			28. Safe and Responsible Use of AI	☑ ☑ ☑ ☑
			29. AI and Cultural Diversity	☑ ☑ ☑ ☑

The Scaffolded AI Literacy (SAIL) Framework for Education

Competencies Across the Four Literacy Levels

AI Concepts		The Impacts of AI

1. People, Organisations, and AI

- **L1:** Recognise critical issues in the relationship between people and AI (bias, hallucinations, uncritical use).
- **L2:** Discuss how AI systems address the needs of people and organisations.
- **L3:** Discuss the role of people and organisations in the development and deployment of AI.
- **AI++:** Design and implement AI strategies to lead ethical governance and contribute to shaping AI policy/standards

2. Engagement with AI

- **L1:** Identify how people are using AI in daily life; give examples of sector impacts.
- **L2:** Discuss the opportunities and risks of AI adoption in specific contexts and how access to AI technologies impacts participation in education, work, and civic life.
- **L3:** Evaluate current and potential uses/harms across disciplines; Analyse how global inequities shape who builds AI and who bears the risks.
- **AI++:** Explore implications of future AI technologies and state-of-the-art developments

3. AI as a Technology

- **L1:** Explain basic concepts of AI and distinguish AI from other technologies.
- **L2:** Understand how algorithms work and how they are used in AI tools and applications.
- **L3:** Evaluate AI models, including fairness across populations; create design principles for AI in context
- **AI++:** Analyse the impact of advanced computing concepts and future technical directions

4. AI in Context

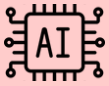
- **L1:** Give examples of how AI has impacted different sectors.
- **L2:** Demonstrate an understanding of AI's role in a specific situation.
- **L3:** Demonstrate an understanding of the role of AI across interdisciplinary fields
- **AI++:** Demonstrate an understanding of the state-of-the-art in AI and its future directions, addressing the benefits and potential risks.

5. Indigenous Perspectives on AI

- **L1:** Recognise Indigenous knowledge, worldviews and values in relation to technology.
- **L2:** Describe how AI can support indigenous aspirations in education, health, and cultural preservation.
- **L3:** Critically evaluate AI systems for alignment with Indigenous data sovereignty and Pacific cultural frameworks.
- **AI++:** Co-develop AI initiatives in partnership with Indigenous communities, embedding relevant cultural principles in governance and design

Competencies Across the Four Literacy Levels

AI Concepts



What AI Is and How It Works

6. AI Terms and Features

- **L1:** Define and recognise common AI terms and features.
- **L2:** Apply terms to explain how AI models are trained, including steps such as input, training, and outputs
- **L3:** Evaluate how deep learning and other architectures shape model capabilities and limitations
- **AI++:** Demonstrate mastery of advanced AI concepts and apply them to novel or domain-specific systems

7. Types of AI

- **L1:** Identify what is, and is not, AI; describe basic categories (rule-based vs. machine learning, generative vs. discriminative).
- **L2:** Compare the main features of different AI approaches
- **L3:** Evaluate the strengths, limitations, and application contexts of different AI systems.
- **AI++:** Design or adapt AI solutions that leverage appropriate system types for specific domains or problems

8. AI and Data

- **L1:** Explain the role of data in AI systems, using simple examples.
- **L2:** Identify and discuss different data sources, including issues of quality, bias, and representativeness
- **L3:** Evaluate how AI systems address problems, how their algorithms are developed, and how they learn patterns from large datasets.
- **AI++:** Apply advanced data practices in the development or adaptation of AI systems

The Scaffolded AI Literacy (SAIL) Framework for Education

Competencies Across the Four Literacy Levels

Application of AI and Technical Skills

Cognitive Skills

9. Understanding AI in Use

- **L1:** Identify features of AI and describe their applications and interactions.
- **L2:** Explain how AI influences tasks, work, and systems.
- **L3:** Evaluate how AI adoption may impact workers differently across industries, focusing on the benefits and mitigating limitations, supporting equity and redistribution of benefits.
- **AI++:** Design and evaluate end-to-end AI processes (from data to lifecycle management).

10. Critical Application of AI

- **L1:** Recognise situations where using AI may or may not be appropriate.
- **L2:** Discuss how AI can support decision-making and problem-solving.
- **L3:** Evaluate the suitability and usefulness of AI technologies for tasks.
- **AI++:** Explore and critique emerging research directions in AI.

11. AI Transparency

- **L1:** Demonstrate awareness of AI inaccuracies and simple checking strategies.
- **L2:** Discuss transparency and explainability in AI, and why they matter.
- **L3:** Evaluate approaches to enhance transparency, explainability, and accountability in AI.
- **AI++:** Apply ethical considerations such as transparency, explainability, and fairness to AI practice/governance.

12. Associated Literacies and learning

- **L1:** Integrate AI literacy into broader digital literacies, considering how equity issues in AI literacy can be supported (recognising differences in access to technology, skills, and learning opportunities).
- **L2:** Demonstrate computational thinking skills relevant to AI.
- **L3:** Demonstrate data literacy, including privacy, management, and governance.
- **AI++:** Sustain continual learning in ethical, societal, and technological aspects of AI.

13. AI in research

- **L1:** Apply and evaluate how AI can support simple research practices (such as literature reviews).
- **L2:** Explore and discuss AI research outputs and implications.
- **L3:** Learn and apply new AI concepts, tools, and techniques independently.
- **AI++:** Contribute to AI research through exploration, hypothesis generation, and scholarly engagement, ensuring knowledge creation respects cultural values.

The Scaffolded AI Literacy (SAIL) Framework for Education

Competencies Across the Four Literacy Levels

Application of AI and Technical Skills  Applied Skills

14. Selecting and Applying AI

- **L1:** Select and apply simple AI tools for specific tasks.
- **L2:** Determine which AI methods/tools best fit different problems or contexts.
- **L3:** Evaluate and implement creative approaches to AI applications across contexts.
- **AI++:** Design and deliver AI projects with measurable outcomes, analysing and reporting findings.

15. Goal-based AI Application and Development

- **L1:** Apply AI tools to achieve personal, learning, or work goals.
- **L2:** Apply AI tools across different fields of study or disciplines and create simple AI applications that promote equitable outcomes.
- **L3:** Develop AI projects using scripts, tools, and libraries.
- **AI++:** Build real-world AI applications leveraging advanced programming and AI techniques.

16. Using and Creating AI Tools

- **L1:** Use AI tools to support simple tasks and reflect on their outputs
- **L2:** Use, adapt and/or combine AI tools to create basic applications.
- **L3:** Apply the steps in AI model development (training, testing, validation, deployment).
- **AI++:** Design, implement, fine-tune, and troubleshoot advanced AI models using frameworks

17. AI in Projects

- **L1:** Recognise examples of AI projects and their purposes.
- **L2:** Contribute to simple AI projects using basic tools or datasets.
- **L3:** Assess how human-centred and culturally grounded design principles affect AI projects.
- **AI++:** Manage and lead AI projects, collaborating with teams and applying coding/software expertise.

18. AI Technologies

- **L1:** Recognise different AI technologies (ML, NLP, CV, etc.).
- **L2:** Explain core machine learning approaches and their applications.
- **L3:** Evaluate how algorithms and data underpin approaches to AI, and their suitability.
- **AI++:** Apply AI frameworks and principles to complex problem-solving.

19. Data in AI Applications

- **L1:** Recognise that AI systems depend on data and identify examples of data used in everyday AI applications.
- **L2:** Explain how datasets (including training and testing sets) are used and transformed to create AI models, and how they must respect Indigenous data sovereignty and cultural protocols.
- **L3:** Process and manage data for AI applications using appropriate tools (e.g., cleaning, preparation, validation).
- **AI++:** Design and implement data pipelines, including integration, feature engineering, and optimisation for AI systems.

Competencies Across the Four Literacy Levels

AI Digital Citizenship

Social, Cultural, and Ethical Issues

20. AI and Society

- **L1:** Recognise potential benefits and challenges of AI in society.
- **L2:** Explore the impact of AI on societal norms, work, creativity, and participation.
- **L3:** Critically analyse approaches to mitigate societal/ethical risks.
- **AI++:** Anticipate future AI directions and lead inclusive AI design that embeds Indigenous worldviews, ensuring culturally sustaining and just outcomes.

21. Ethical issues in AI

- **L1:** Identify common ethical concerns in AI (e.g., bias, fairness, transparency).
- **L2:** Provide examples of ethical issues across AI use cases, recognising the role of cultural frameworks in shaping ethical AI use.
- **L3:** Evaluate ethical challenges in AI design and implementation.
- **AI++:** Apply and test principles-based frameworks in practice.

22. AI and Culture

- **L1:** Explain AI's relationship with culture and values.
- **L2:** Explore the impact of AI on Indigenous and disadvantaged groups
- **L3:** Analyse how AI design decisions may reinforce or disrupt structural inequities (e.g., racism, sexism, class bias).
- **AI++:** Lead inclusive AI development that respects cultural values.

23. AI Bias

- **L1:** Explain how bias occurs in AI systems.
- **L2:** Evaluate how data quality and sources shape bias in models
- **L3:** Analyse the impacts of bias and propose strategies for diverse datasets.
- **AI++:** Demonstrate and critique deliberate bias to raise ethical awareness.

24. AI Policy

- **L1:** Recognise that AI requires governance and oversight.
- **L2:** Describe examples of AI policies/regulations in practice.
- **L3:** Discuss the role of AI policy and governance, including how it reflects obligations to Indigenous rights (such as those under Te Tiriti).
- **AI++:** Contribute to policy and guideline development for ethical AI and respect Indigenous sovereignty and minority rights.

25. AI and Equity

- **L1:** Recognise that AI can create unequal impacts for different groups.
- **L2:** Explore how AI access and use vary across socio-economic, cultural, and geographic contexts.
- **L3:** Critically evaluate AI systems for equity, fairness, and accessibility.
- **AI++:** Lead AI initiatives that promote equity, social justice, and inclusive design.

Competencies Across the Four Literacy Levels

AI Digital Citizenship

Risks and Mitigations

26. Risks of AI Systems

- **L1:** Identify risks presented by AI systems (e.g., privacy, security, fraud, misuse).
- **L2:** Assess risks related to data use in AI, including accuracy, relevance, storage, and potential misuse.
- **L3:** Evaluate current risks of AI implementation, including human–AI interaction, intellectual property, and societal impacts.
- **AI++:** Anticipate and analyse future risks of AI (e.g., advanced cybersecurity threats, malicious use), balancing benefits against potential harms.

27. Mitigating the Risks of AI

- **L1:** Recognise and describe simple ways to mitigate risks presented by AI systems (e.g., safe passwords, privacy settings).
- **L2:** Apply strategies to protect personal rights and privacy when interacting with AI (e.g., consent, data-sharing policies).
- **L3:** Implement strategies to enhance safety, security, and reliability of AI systems, ensuring ethical data collection and management.
- **AI++:** Design and embed safeguards into AI systems to mitigate psychological, societal, and security risks across diverse contexts.

28. Safe and Responsible Use of AI

- **L1:** Demonstrate responsible behaviours when using AI tools, recognising potential misuse.
- **L2:** Apply ethical frameworks to evaluate AI's impact on individuals and society, considering fairness and justice.
- **L3:** Use a critical mindset to question assumptions and limitations of AI tools.
- **AI++:** Demonstrate a safety-first, equitable and accessible approach in AI development, taking responsibility for system impacts and long-term consequences.

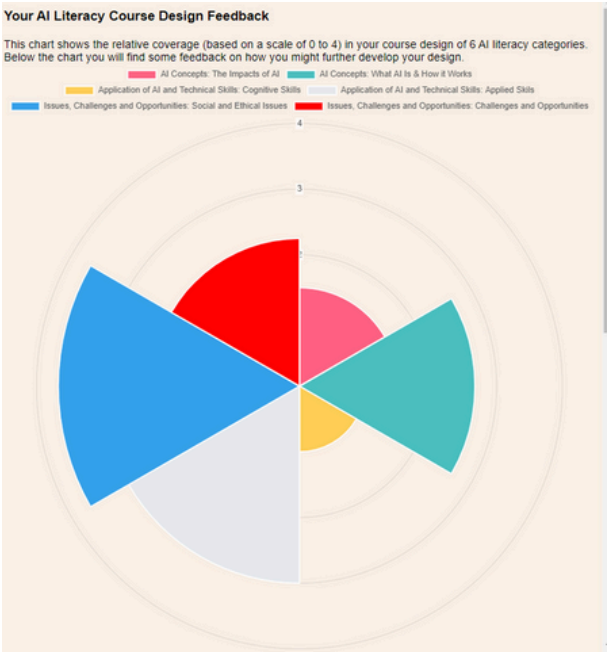
29. AI and Cultural Diversity

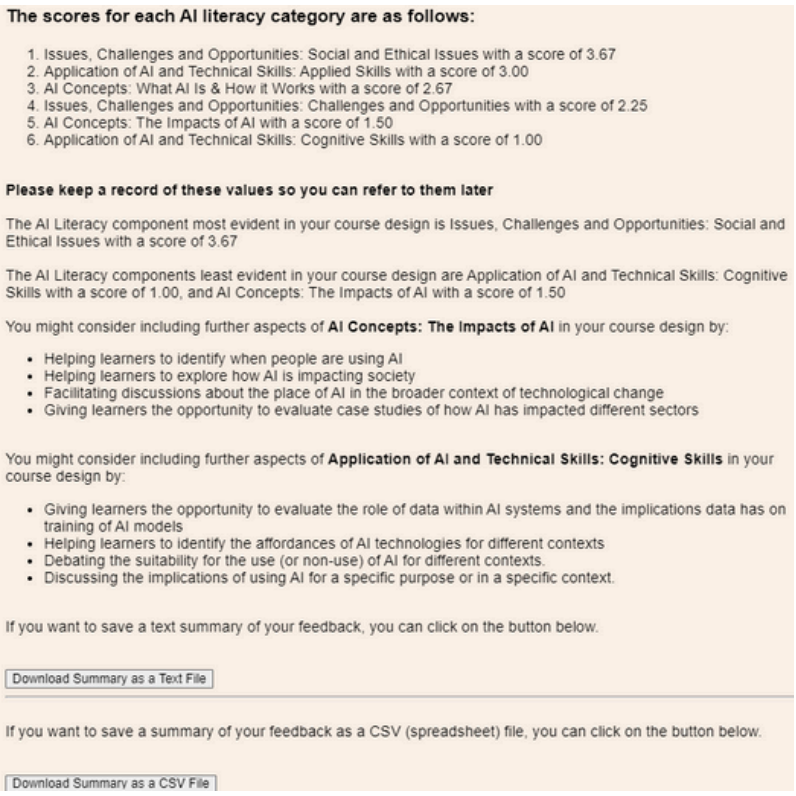
- **L1:** Discuss the impact of AI on cultural diversity and identify risks of cultural bias.
- **L2:** Recognise how AI can impact minority cultures, including Māori and Pacific peoples, and apply principles of Indigenous data sovereignty.
- **L3:** Advocate for inclusive AI applications by addressing diverse user needs and avoiding discriminatory impacts.
- **AI++:** Lead the design and implementation of inclusive AI systems that respect cultural diversity and social justice.

The Scaffolded AI Literacy (SAIL) Framework for Education

The AI Literacy Analyser

To help educators assess the levels of AI literacy covered in their courses, we have developed the AI Literacy Analyser tool, which runs in the browser and gives feedback on the coverage of the competencies and categories of the framework at level 1 - "know and understand AI" - since this includes all the foundational components of AI literacy that are important to all learners.





The scores for each AI literacy category are as follows:

1. Issues, Challenges and Opportunities: Social and Ethical Issues with a score of 3.67
2. Application of AI and Technical Skills: Applied Skills with a score of 3.00
3. AI Concepts: What AI Is & How it Works with a score of 2.67
4. Issues, Challenges and Opportunities: Challenges and Opportunities with a score of 2.25
5. AI Concepts: The Impacts of AI with a score of 1.50
6. Application of AI and Technical Skills: Cognitive Skills with a score of 1.00

Please keep a record of these values so you can refer to them later

The AI Literacy component most evident in your course design is Issues, Challenges and Opportunities: Social and Ethical Issues with a score of 3.67

The AI Literacy components least evident in your course design are Application of AI and Technical Skills: Cognitive Skills with a score of 1.00, and AI Concepts: The Impacts of AI with a score of 1.50

You might consider including further aspects of **AI Concepts: The Impacts of AI** in your course design by:

- Helping learners to identify when people are using AI
- Helping learners to explore how AI is impacting society
- Facilitating discussions about the place of AI in the broader context of technological change
- Giving learners the opportunity to evaluate case studies of how AI has impacted different sectors

You might consider including further aspects of **Application of AI and Technical Skills: Cognitive Skills** in your course design by:

- Giving learners the opportunity to evaluate the role of data within AI systems and the implications data has on training of AI models
- Helping learners to identify the affordances of AI technologies for different contexts
- Debating the suitability for the use (or non-use) of AI for different contexts.
- Discussing the implications of using AI for a specific purpose or in a specific context.

If you want to save a text summary of your feedback, you can click on the button below.

Download Summary as a Text File

If you want to save a summary of your feedback as a CSV (spreadsheet) file, you can click on the button below.

Download Summary as a CSV File

The tool asks a series of questions and then generates a radar chart of the coverage of each of the six categories.

From this, it provides some advice about how to incorporate more aspects of AI literacy into the course.

It also has options to download:

- A text file of the advice shown on screen for later reference
- A spreadsheet that contains the user's input data and the generated totals for further analysis

The tool can be accessed at: https://davidparsons.ac.nz/AIanalyser.html or by scanning the QR code.

Next steps

The next steps for the framework are to continue to gather feedback from the relevant communities and create comprehensive support materials for educators that will help them develop AI literacy in themselves and their students.

AI Literacy is an evolving area of knowledge and understanding, and as AI technologies and applications evolve, the AI literacy framework will also need to respond to these changes.

Our research into this area will continue as we evaluate the use of the framework in practice and develop further resources to help educators embrace AI literacy.

Further Information

If you would like further information, or to be involved in future phases of this research, please contact Associate Professor Kathryn MacCallum via email:

kathryn.maccallum@canterbury.ac.nz

To quote this report we suggest:

MacCallum, K., Parsons, D., & Mohaghegh, M. (2026). The Scaffolded AI Literacy (SAIL) Framework for Education: Preparing learners at all levels to engage constructively with Artificial Intelligence.

With thanks to the members of the Delphi panel who provided their invaluable insights and arguments during the creation of the framework.

References

Faruqe, F., Watkins, R., & Medsker, L. (2022). Competency Model Approach to AI Literacy: Research-Based Path From Initial Framework to Model. Advances in Artificial Intelligence and Machine Learning, 2(4), 580–587.

Kandlhofer, M., Steinbauer, G., Hirschmugl-Gaisch, S., & Huber, P. (2016). Artificial intelligence and computer science in education: From kindergarten to university. 2016 IEEE Frontiers in Education Conference (FIE), Erie, PA, USA, 2016, pp. 1-9, doi: https://doi.org/10.1109/FIE.2016.7757570.

Konishi, Y. (2016, January). Special Series - What is Needed for AI Literacy? Research Institute of Economy, Trade and Industry. https://www.rieti.go.jp/en/columns/s16_0014.htm.

Long, D., & Magerko, B. (2020). What Is AI Literacy? Competencies and Design Considerations. In Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems, 1–16. CHI '20. New York, NY, USA: ACM https://doi.org/10.1145/3313831.3376727.

UNESCO. (2021). Recommendation on the Ethics of Artificial Intelligence. UNESCO. https://unesdoc.unesco.org/ark:/48223/pf0000381137.

UNESCO. (2022). K-12 AI curricula: A mapping of government-endorsed AI curricula (Education 2030). UNESCO. https://unesdoc.unesco.org/ark:/48223/pf0000380602.

WEF. (2022, March 17). Without universal AI literacy, AI will fail us. World Economic Forum. https://www.weforum.org/agenda/2022/03/without-universal-ai-literacy-ai-will-fail-us/.