Utilising Artificial Intelligence in Work-Integrated Learning

Artificial Intelligence in Science Discipline Work Integrated Learning

Table of Contents

Introduction

Work Integrated Learning (WIL) bridges theoretical knowledge with practical workplace experience, preparing students for careers in scientific fields. Incorporating artificial intelligence (AI) into WIL creates innovative learning experiences that reflect the growing role of AI in scientific research and industry.

This guidebook provides educators, industry partners, and students with practical frameworks for integrating AI tools and methodologies into science discipline WIL programs, enhancing both learning outcomes and workplace readiness.

Please note that give the rapid progression of AI it is likely that this aspect has the potential to become outdated quickly. There is also an excellent body of information and resources to further support AI applications in WIL and this literature source can be found in the reference section.

Understanding AI in Scientific Contexts

Key AI Applications in Scientific Fields

Scientific Discipline	Common AI Applications
Biology	Protein structure prediction, genomic analysis, drug discovery
Chemistry	Molecular modelling, reaction prediction, compound screening
Physics	Particle identification, simulation modelling, data analysis
Environmental Science	Climate modelling, species identification, remote sensing analysis
Medical Science	Diagnostic imaging, patient data analysis, treatment optimisation

AI Literacy for WIL Success

Before implementing AI in WIL, ensure participants understand:

1. **Basic AI concepts**: Machine learning, neural networks, supervised vs. unsupervised learning
2. **Data requirements**: How data quality affects AI outcomes
3. **Tool capabilities and limitations**: Realistic expectations of what AI can achieve
4. **Domain-specific applications**: How AI is currently used in the relevant scientific field

Designing AI-Enhanced WIL Opportunities

Step 1: Identify Appropriate AI Integration Points

Evaluate existing WIL frameworks for opportunities to integrate AI:

- **Data analysis stages**: Where manual analysis could be complemented with AI tools
- **Repetitive tasks**: Processes that could be automated to allow focus on higher-order thinking
- **Decision support**: Areas where AI can provide additional insights
- **Innovation spaces**: Opportunities for novel applications of AI in established processes

Step 2: Match AI Tools to Learning Outcomes

Learning Outcome	Potential AI Application	Example Tool
Data analysis skills	Predictive modelling	Scikit-learn, TensorFlow
Critical assessment of results	AI-generated analyses requiring verification	LIME, SHAP for explainable AI
Research design	Literature review assistance	Semantic Scholar, Elicit.org
Communication skills	Data visualisation	Plotly, Tableau
Problem-solving	Simulation environments	OpenAI Gym, NetLogo

Step 3: Design Progressive AI Skill Development

Create a progression of AI engagement:

1. **AI Consumer**: Students use established AI tools with guidance
2. **AI Collaborator**: Students customise or fine-tune AI approaches
3. **AI Creator**: Students design or implement novel AI applications

Implementation Guide

For Educators/Coordinators: Setting Up AI-Enhanced WIL Programs

Step-by-Step Implementation Process:

1. **Assessment of Prerequisites**
    - Evaluate necessary computational resources
    - Identify required student knowledge/skills
    - Determine appropriate AI literacy training needs
2. **Partnership Development**
    - Identify industry partners using relevant AI technologies
    - Establish clear expectations for AI integration
    - Create agreements addressing data privacy and intellectual property
3. **Curriculum Integration**
    - Develop pre-placement AI training modules
    - Create reflection frameworks specific to AI experiences
    - Design assessment methods for AI-related competencies
4. **Resource Preparation**
    - Compile tutorials for specific AI tools
    - Develop troubleshooting guides
    - Create ethics guidelines for AI use

For Industry Supervisors: Mentoring with AI Tools

1. **Project Scoping**
    - Identify appropriate real-world problems for AI application
    - Determine necessary data access and preparation
    - Set realistic expectations for AI outcomes
2. **Supervision Approach**
    - Balance guidance with independence
    - Establish check-in points for AI implementation
    - Create opportunities for critical reflection on AI results
3. **Feedback Methods**
    - Provide specific feedback on AI tool selection and implementation
    - Guide interpretation of AI-generated outputs
    - Encourage questioning of AI limitations

For Students: Maximising AI-Enhanced WIL Experiences

1. **Preparation Checklist**
    - Complete foundational AI literacy training
    - Research AI applications in your specific placement context
    - Prepare questions about organisational AI use
2. **During Placement Process**
    - Document AI tool usage and outcomes
    - Compare AI-assisted versus traditional approaches
    - Identify opportunities for process improvement
3. **Reflection Framework**
    - Evaluate limitations encountered in AI applications
    - Connect theoretical knowledge with practical implementation
    - Identify skills gaps for future development

Assessment and Evaluation

Assessing Student Learning in AI-Enhanced WIL

Assessment Area	Sample Methods	Considerations
Technical AI skills	Code review, tool demonstrations	Focus on appropriate use rather than development expertise
Critical analysis	Reports comparing AI and manual results	Encourage identification of both benefits and limitations
Ethical reasoning	Case studies, scenario responses	Include real ethical dilemmas from placement
Communication	Presentations explaining AI approaches to non-specialists	Assess clarity and accuracy

Evaluating Program Effectiveness

Track these metrics to assess your AI-WIL integration:

1. **Student outcomes**: Skills development, employment in AI-related roles
2. **Partner satisfaction**: Industry feedback, continued participation
3. **Project impacts**: Contributions to organisational objectives
4. **Learning progression**: Student confidence and competence with AI tools

Case Studies and Examples

Case Study 1: Environmental Science - Water Quality Monitoring

Context: Students on placement with environmental monitoring agency

AI Integration: Machine learning for automated identification of contaminants from sensor data

Implementation Process:

1. Students received training on water quality parameters and ML classification
2. Teams deployed sensors and collected training data
3. Students developed and tested classification models
4. Results were verified against laboratory testing
5. Students presented findings to stakeholders

Outcomes: Students developed cross-disciplinary skills in environmental science, data collection, and machine learning. Agency implemented a permanent monitoring system based on student work.

Literature Reference: Similar approaches described in Khandelwal et al. (2022) "Machine Learning for Real-time Water Quality Assessment" in Environmental Monitoring and Assessment.

Case Study 2: Pharmaceutical Research - Drug Candidate Screening

Context: Chemistry students placed with pharmaceutical research lab

AI Integration: Using AI prediction models to prioritise compound testing

Implementation Process:

1. Students learned existing compound screening protocols
2. Training on AI-based virtual screening tools
3. Students applied both approaches to same compound libraries
4. Comparative analysis of efficiency and accuracy
5. Development of integrated workflow combining both methods

Outcomes: 40% reduction in physical testing requirements while maintaining discovery rate. Students gained experience in both traditional and AI-enhanced research methods.

Literature Reference: Based on approaches outlined in Johnson et al. (2023) "Integrating Deep Learning into Undergraduate Chemistry Research Experiences" in Journal of Chemical Education.

Case Study 3: Hospital Pathology - Diagnostic Imaging

Context: Medical science students in hospital pathology department

AI Integration: AI-assisted identification of cellular abnormalities

Implementation Process:

1. Training in traditional microscopy and analysis
2. Introduction to AI-based image analysis tools
3. Side-by-side comparison of methods
4. Development of verification protocols for AI results
5. Creation of integrated workflow

Outcomes: Students developed critical assessment skills and understanding of AI limitations. Department adopted student-developed protocols for AI result verification.

Literature Reference: Similar to approach described in Garcia-Martin et al. (2021) "Work-integrated learning with AI diagnostic tools in undergraduate medical education" in BMC Medical Education.

Ethical Considerations

Key Ethical Framework for AI in WIL

Implement this checklist for all AI-enhanced WIL activities:

Data Privacy and Security

- Ensure compliance with relevant regulations
- Implement appropriate anonymisation techniques
- Secure storage and access protocols

Bias and Fairness

- Assess training data for representativeness
- Implement bias detection methods
- Require critical assessment of AI outputs

Transparency

- Document AI decision-making processes
- Disclose AI use to relevant stakeholders
- Maintain human oversight of critical decisions

Intellectual Property

- Clarify ownership of AI-generated outputs
- Address student contributions to proprietary systems
- Consider open science and sharing principles

Implementation Guidelines for Ethical AI Use

1. Integrate ethics discussions throughout the WIL experience
2. Create clear protocols for reporting ethical concerns
3. Include ethical reflection in assessment components
4. Provide case studies of ethical dilemmas in relevant fields

Resources and Tools

Free/Open Source AI Tools for Science Education

Category	Tools	Applications
Data Analysis	Scikit-learn, Orange	Statistical analysis, visualisation, modelling
Deep Learning	TensorFlow, PyTorch	Image analysis, complex pattern recognition
Natural Language Processing	NLTK, spaCy	Literature mining, report analysis
Discipline-Specific	BioPython, RDKit, AstroPy	Domain-specific data processing
Explainable AI	LIME, SHAP	Understanding AI decision-making

Learning Resources

Online Courses:

- Elements of AI (University of Helsinki) - accessible introduction
- AI for Everyone (Coursera) - non-technical overview
- *Discipline-specific AI courses* on platforms like edX and Coursera

Tutorials and Documentation:

- Towards Data Science - practical tutorials
- Papers with Code - implementation guides for research papers
- TensorFlow and PyTorch documentation

Communities:

- AI4Science initiative
- Kaggle competitions and forums
- GitHub repositories with educational resources

Implementation Templates

Download starter templates for:

- AI-WIL project scoping documents
- Student reflection prompts for AI experiences
- Assessment rubrics for AI-enhanced projects
- Ethical review checklists

Appendix: Quick Start Guides

Quick Start Guide 1: Setting Up a Basic ML Analysis Project

1. Define the scientific question
2. Identify appropriate data sources
3. Select suitable preprocessing techniques
4. Choose an appropriate algorithm
5. Implement validation methods
6. Document limitations and assumptions

Quick Start Guide 2: Integrating AI Ethics into WIL Supervision

1. Review data sources for consent and privacy
2. Assess potential impacts on stakeholders
3. Implement transparent documentation practices
4. Establish human oversight protocols
5. Create feedback mechanisms for ethical concerns

Quick Start Guide 3: Student Preparation for AI-Enhanced WIL

1. Complete basic Python programming tutorials
2. Practice with introductory ML examples
3. Research AI applications in your field
4. Review ethical guidelines for AI use
5. Prepare questions about workplace AI implementation

AI Prompts that can assist in designing a WIL opportunity

Design Prompt: Creating Industry Placements for Science Students

Purpose

This prompt will help you design a structured, meaningful work integrated learning (WIL) opportunity for science students that aligns with both industry objectives and educational requirements.

Instructions

1. Use this template to develop a placement opportunity that can be adapted to different time frames (12, 24, 48, or 72 days)
2. Fill in each section with relevant details for your organisation and the specific science discipline
3. Consider how AI tools might enhance the project and student learning experience
4. Include clear deliverables and learning outcomes aligned with the duration
5. Share the completed plan with the educational institution for review and approval

Template

PLACEMENT OVERVIEW

Organisation Name: [Your organisation]

Industry Sector: [Your sector]

Science Discipline: [Specific discipline: Environmental Science/Biology/Chemistry/Geology/Physics/etc.]

Placement Duration: [Select: 12 days / 24 days / 48 days / 72 days]

Location: [On-site/Remote/Hybrid]

Placement Title: [Create an engaging, descriptive title]

AI Tools Utilised: [List any artificial intelligence tools or platforms students will use]

INTRODUCTION AND CONTEXT

Organisational Context:

- Briefly describe your organisation's mission and work
- Explain how this discipline connects to your operations
- Identify the team the student will join

Project Background:

- Describe the challenge, opportunity, or need this project addresses
- Explain why this project matters to your organisation
- Outline any previous work done in this area

Real-World Application:

- Describe how this project connects to current industry trends or challenges
- Explain how the outcomes will be used by your organisation

PROJECT DESCRIPTION

Project Summary: [2-3 sentences summarising what the student will do and achieve]

Key Questions to Address:

1. [Primary question the project will answer]
2. [Secondary question if applicable]
3. [Additional questions as appropriate]

Project Scope:

- What is included in this project
- What is explicitly out of scope
- Any constraints or limitations

Resources Available:

- Equipment/technology access
- Data sets or samples

- Subject matter experts
- Reference materials
- Software or tools

Expected Challenges:

- Identify potential difficulties the student may encounter
- Describe how these challenges provide learning opportunities

PROJECT TIMELINE

[ADJUST BASED ON SELECTED DURATION]

For a [12/24/48/72]-day placement:

Phase	Activities	Deliverables	Days	Timeline
Orientation	• Organisation introduction • Project briefing • Team introductions • System access setup	• Onboarding checklist complete • Initial questions document	[X] days	Days 1-[X]
Training	• Tool/method training • Safety protocols • Background research	• Training completion record • Research summary	[X] days	Days [X]-[X]
Initial Assessment	• Data/sample review • Methodology planning • Project plan development	• Project plan • Methodology document	[X] days	Days [X]-[X]
Implementation	• Data collection • Experimental work • Analysis • AI tool application	• Raw data/results • Analysis documentation • Progress reports	[X] days	Days [X]-[X]
Evaluation	• Results interpretation • Findings validation • Limitations assessment	• Preliminary findings report • Validation documentation	[X] days	Days [X]-[X]
Communication	• Final report preparation	• Final report • Presentation slides	[X] days	Days [X]-[X]

Phase	Activities	Deliverables	Days	Timeline
	• Presentation development • Documentation completion	• Project documentation		
Reflection	• Project review • Feedback session • Future recommendations	• Reflection document • Recommendations report	[X] days	Days [X]-[X]

Key Milestones:

1. Project plan approval - Day [X]
2. Preliminary data collection complete - Day [X]
3. Initial analysis review - Day [X]
4. Draft findings presentation - Day [X]
5. Final presentation and deliverables - Day [X]

PROJECT OUTCOMES

Deliverables:

1. [Primary tangible output - report/dataset/analysis/prototype/etc.]
2. [Secondary deliverable]
3. [Additional deliverables as appropriate for duration]
4. Final presentation to stakeholders
5. Complete documentation package

Success Criteria:

Outcome	Minimum Success	Target Success	Stretch Goal
[Outcome 1]	[Basic achievement]	[Desired achievement]	[Exceptional achievement]
[Outcome 2]	[Basic achievement]	[Desired achievement]	[Exceptional achievement]
[Outcome 3]	[Basic achievement]	[Desired achievement]	[Exceptional achievement]

Organisational Benefits:

- How this project advances organisational objectives
- Potential applications of project outcomes
- Value created for stakeholders

STUDENT LEARNING OUTCOMES

Technical Skills:

- [Specific discipline skill #1]
- [Specific discipline skill #2]

- [Technical method/tool usage]
- [Data analysis approach]
- [AI tool application]

Professional Skills:

- Project management
- Communication with stakeholders
- Problem-solving in workplace context
- Time management
- Teamwork and collaboration

Career Development Opportunities:

- Industry network connections
- Portfolio development
- Professional references
- Potential publication or presentation opportunities
- Skills in emerging technologies

SUPERVISION AND SUPPORT

Primary Supervisor:

- Name and position
- Contact information
- Expertise relevant to project
- Supervision approach

Additional Support Personnel:

- Technical advisors
- Administrative support
- Team members for collaboration

Check-in Schedule:

- Daily quick check-ins
- Weekly in-depth progress reviews
- Mid-placement evaluation
- Final review session

Feedback Mechanisms:

- How and when feedback will be provided
- Opportunities for student questions
- Process for addressing challenges

EVALUATION PLAN

Student Performance Assessment:

- Metrics for technical work quality
- Professional behaviour expectations
- Communication effectiveness criteria
- Problem-solving approach assessment

Project Success Evaluation:

- How deliverable quality will be assessed
- Usefulness of outcomes to organisation
- Knowledge transfer effectiveness
- Potential for project continuation

Documentation Requirements:

- Project documentation standards
- Required reporting formats
- Evidence collection expectations

Example Output

For 12-day placement:

- Focus on a single well-defined task or analysis
- Use existing data/samples rather than new collection
- Emphasise observation and application over innovation

For 24-day placement:

- Include a small original data collection component
- Add basic analysis and recommendation development
- Incorporate limited stakeholder interaction

For 48-day placement:

- Expand to include multiple experimental/analysis components
- Add deeper literature review and context development
- Include direct stakeholder engagement and feedback incorporation

For 72-day placement:

- Include comprehensive project lifecycle experience
- Add implementation planning for recommendations
- Incorporate advanced AI applications or tool development
- Include knowledge transfer to organisational staff

Example of Prompt Implementation

Environmental Data Analysis Consultancy Placement: Climate Impact Assessment

PLACEMENT OVERVIEW

Organisation Name: Climate Insight Policy Advisory Group

Industry Sector: Environmental Policy Consulting

Science Discipline: Environmental Science / Climate Science

Placement Duration: 12 days

Location: Remote with 2 on-site presentation days

Placement Title: Urban Heat Island Effect Analysis for Municipal Climate Adaptation Planning

AI Tools Utilised: Geospatial analysis ML models, Climate data visualisation platforms

INTRODUCTION AND CONTEXT

Organisational Context: Climate Insight Policy Advisory Group provides evidence-based environmental policy recommendations to local and state governments. Our team specialises in translating complex climate science into actionable policy frameworks. The student will join our Urban Resilience Team, which is currently engaged in multiple municipal climate adaptation projects.

Project Background: Our organisation has been contracted by Metro City Council to analyse existing temperature data and identify urban heat island hotspots to inform their Climate Adaptation Plan. The city has collected five years of temperature data from 24 monitoring stations across the metropolitan area but lacks the capacity to perform comprehensive spatial and temporal analysis. This analysis will directly inform the placement of cooling centres, urban greening initiatives, and emergency response protocols.

Real-World Application: This project addresses an immediate need in municipal climate planning. The findings will be incorporated into Metro City's official Climate Adaptation Plan, potentially influencing infrastructure investments worth $12M over the next five years. The methodology developed may also be applied to other municipalities in our client portfolio.

PROJECT DESCRIPTION

Project Summary: The student will analyse existing temperature monitoring data, integrate it with land use classification data, and develop spatial visualisations and statistical analyses to identify urban heat island patterns and severity across Metro City, culminating in a policy brief with specific recommendations.

Key Questions to Address:

1. Which neighbourhoods experience the most severe urban heat island effects?
2. What land use characteristics correlate most strongly with temperature anomalies?
3. How have urban heat patterns changed over the available 5-year monitoring period?

Project Scope:

- Includes: Analysis of existing temperature data, correlation with land use data, identification of hotspots, development of visualisation tools
- Excludes: New data collection, detailed building-level analysis, implementation planning
- Constraints: Fixed dataset, 12-day timeframe, policy-focused outputs

Resources Available:

- Complete temperature dataset (5 years, 24 stations, hourly readings)
- GIS files with land use classification, tree canopy data, and socioeconomic indicators
- Access to ArcGIS and statistical analysis software
- AI-powered geospatial analysis tools with pre-trained models
- Previous reports and policy briefs (as templates)
- Senior policy analyst for guidance and feedback

Expected Challenges:

- Data quality issues in some monitoring stations
- Integrating multiple spatial data formats
- Balancing technical rigor with policy accessibility
- Addressing confounding variables in spatial patterns
- Developing actionable recommendations from complex patterns

PROJECT TIMELINE

For a 12-day placement:

Phase	Activities	Deliverables	Days	Timeline
Orientation	• Project briefing • Data familiarisation • Tool access setup • Literature review	• Project plan • Initial questions document • Literature summary	2 days	Days 1-2
Data Processing	• Data cleaning • Quality assessment • Format standardisation • Initial exploratory analysis	• Processed dataset • Data quality report • Initial visualisations	3 days	Days 3-5
Analysis	• Statistical analysis • Spatial pattern identification • Correlation analysis	• Analysis documentation • Statistical results	3 days	Days 6-8

Phase	Activities	Deliverables	Days	Timeline
	• Machine learning model application	• Spatial distribution maps		
Synthesis	• Pattern interpretation • Priority area identification • Recommendation development • Visualisation refinement	• Summary finding • Draft recommendation • Final visualisations	2 days	Days 9-10
Communication	• Policy brief development • Presentation preparation • Documentation finalisation	• Policy brief • Presentation slides • Technical appendix	2 days	Days 11-12

Key Milestones:

1. Project plan approval - Day 2
2. Data processing completion - Day 5
3. Analysis completion - Day 8
4. Draft policy brief - Day 10
5. Final presentation to Metro City Council - Day 12

PROJECT OUTCOMES

Deliverables:

1. Comprehensive urban heat island analysis report with methodology documentation
2. Policy brief with evidence-based recommendations (5-7 pages)
3. Interactive heat map visualisations for stakeholder engagement
4. Technical appendix with detailed statistical analysis
5. Presentation to Metro City Council planning committee

Success Criteria:

Outcome	Minimum Success	Target Success	Stretch Goal
Data Analysis	Basic statistical analysis of temperature patterns	Comprehensive multi-variable analysis with temporal trends	Machine learning model to predict future heat patterns
Visualisation	Static maps of heat patterns	Interactive visualisation with multiple variables	Web-based dashboard for public engagement

Outcome	Minimum Success	Target Success	Stretch Goal
Recommendations	General areas for intervention	Specific, prioritised recommendations with evidence base	Cost-benefit analysis of intervention options
Policy Integration	Accepted analysis	Direct incorporation into Climate Adaptation Plan	Expansion of methodology to neighbouring municipalities

Organisational Benefits:

- Delivery of high-quality analysis to key client
- Efficient use of AI tools to enhance service offerings
- Reusable methodology for future municipal clients
- Strengthened relationship with Metro City Council
- Potential for expanded project scope following successful delivery

STUDENT LEARNING OUTCOMES

Technical Skills:

- Environmental data analysis techniques
- Geospatial analysis and visualisation
- Statistical methods for climate data
- Application of machine learning models to environmental data
- Policy-relevant data presentation

Professional Skills:

- Consultancy project management
- Client-focused communication
- Translating technical findings to policy recommendations
- Data storytelling and visualisation
- Working within tight timeframes
- Balancing detail with accessibility

Career Development Opportunities:

- Experience in environmental policy consulting
- Portfolio example of policy-relevant analysis
- Network connections with municipal officials
- Experience presenting to government stakeholders
- Practical application of data science in policy context

SUPERVISION AND SUPPORT

Primary Supervisor:

- Dr. Marcus Williams, Senior Policy Analyst
- marcus.williams@climateinsight-example.com, (555) 987-6543
- Expertise in urban climate policy and data analysis
- Supervision approach: Daily check-ins, collaborative problem-solving, iterative feedback

Additional Support Personnel:

- Elena Vazques - GIS Specialist (mapping support)
- Dr. Amir Patel - Climate Data Scientist (analysis support)
- Olivia Chen - Policy Writer (communication support)

Check-in Schedule:

- Daily 30-minute morning check-ins
- Mid-project review (Day 6)
- Pre-presentation review (Day 11)
- Final debrief (Day 12)

Feedback Mechanisms:

- Real-time feedback on analysis approaches
- Written feedback on all deliverables within 24 hours
- Collaborative review sessions for visualisations and recommendations
- Direct client feedback during presentation

EVALUATION PLAN

Student Performance Assessment:

- Technical accuracy of analysis
- Clarity of data communication
- Quality of visualisations
- Relevance of recommendations to policy needs
- Professionalism in client interactions
- Adaptability to feedback
- Time management

Project Success Evaluation:

- Client satisfaction with deliverables
- Usability of recommendations in policy context
- Technical quality of analysis
- Potential for methodology reuse
- Contribution to organisational capabilities

Documentation Requirements:

- Complete methodology documentation
- Organised data files with metadata
- Annotated code/queries for reproducibility
- Source information for all references
- Summary of lessons learned

ADAPTATION NOTES

This 12-day placement is specifically designed to:

- Focus on analysis of existing data rather than new data collection
- Emphasise a single, well-defined deliverable (policy brief)
- Provide experience in the consultancy environment
- Offer exposure to the government-consultant relationship
- Develop skills in translating technical findings to policy recommendations

Key benefits of this short-term placement:

- Complete project cycle experience in condensed timeframe
- Direct impact on real-world policy decisions
- Development of highly transferable data analysis skills
- Exposure to climate policy consulting career path
- Tangible portfolio piece demonstrating analysis capabilities

Support Virtual WIL Placements using AI

Here are some examples of how AI can support virtual Work-Integrated Learning (WIL) placements in the sciences:

1. Virtual lab simulations where AI guides students through experiments, providing real-time feedback and adapting difficulty based on performance.
2. AI-powered research assistants that help students analyse scientific literature, generate hypotheses, and design experiments.
3. Data analysis tools that teach students to process and interpret complex scientific datasets, with AI providing guidance on statistical methods and visualisation techniques.
4. Virtual mentorship programs where AI systems simulate interactions with industry professionals, presenting realistic workplace scenarios and challenges.
5. Scientific writing assistants that help students develop research papers, lab reports, and documentation to industry standards.
6. Remote equipment monitoring and control systems that allow students to operate laboratory instruments from a distance with AI safety protocols.
7. Virtual field work simulations for ecology, geology, or environmental science, using AI to create realistic environments and scenarios.
8. Case-based learning modules where AI presents complex scientific problems from industry and guides students through solution approaches.
9. Personalised learning paths that adapt to each student's strengths and weaknesses in scientific concepts relevant to their placement.
10. Collaborative project management tools with AI facilitators that help student teams coordinate research efforts and maintain industry-standard documentation.

Designing a Virtual WIL Placement using AI

Virtual WIL Experience for Science Students: Biotech Innovations

Program Overview

This 12-week virtual WIL program immerses science students in a simulated biotechnology research and development environment. Students work as junior scientists at "Biotech Innovations," a fictional but realistic biotech company developing novel therapeutic approaches for autoimmune diseases.

Learning Objectives

- Apply theoretical knowledge to practical research problems
- Develop scientific research and laboratory skills in a virtual environment
- Build professional communication and collaboration skills
- Understand industry workflows, regulatory considerations, and product development
- Create a portfolio of work demonstrating applied scientific capabilities

Program Structure

Week 1-2: Orientation and Background Research

- Company onboarding with virtual HR and team introductions
- Literature review of current autoimmune disease treatments
- Training on virtual laboratory equipment and company protocols
- Initial team meetings and project briefing

Week 3-5: Experimental Design and Initial Testing

- Collaborative development of research protocols
- Virtual laboratory simulations for initial experiments
- Data collection and preliminary analysis
- Weekly team meetings with AI-simulated senior scientists

Week 6-8: Data Analysis and Iteration

- In-depth analysis of experimental results
- Troubleshooting and experimental refinement
- Virtual collaborative sessions with interdisciplinary teams
- Mid-program evaluation and feedback

Week 9-11: Advanced Testing and Reporting

- Final experimental iterations
- Statistical analysis and interpretation of results
- Scientific report writing and presentation preparation
- Regulatory considerations and documentation

Week 12: Presentation and Reflection

- Final presentation to AI-simulated executive team
- Professional portfolio compilation
- Reflection on learning outcomes and skill development
- Career pathway discussions with AI-simulated industry mentors

Technology Components

AI-Driven Virtual Lab

- Interactive 3D laboratory environment
- Realistic simulation of laboratory equipment and procedures
- Real-time feedback on technique and experimental design
- Automated data generation based on experimental parameters

AI Research Assistant

- Literature search and summarisation capabilities
- Experimental design guidance
- Data analysis support
- Scientific writing feedback

Virtual Team Members and Mentors

- AI-simulated colleagues with distinct personalities and expertise
- Realistic workplace scenarios and challenges
- Mentorship from AI-simulated senior scientists
- Networking opportunities with AI-simulated industry professionals

Collaborative Platform

- Project management tools with industry-standard documentation
- Communication channels simulating workplace interactions
- File sharing and version control systems
- Progress tracking and feedback mechanisms

Assessment Components

1. Laboratory technique and experimental design (virtual lab performance)
2. Data analysis and interpretation (submitted reports)
3. Scientific communication (presentations and team interactions)
4. Professional behaviour and collaboration (assessed through virtual team dynamics)
5. Final project portfolio and presentation

Industry Integration

- Case studies based on real industry challenges
- Guest lectures from actual industry professionals

- Review of current regulatory frameworks
- Industry-standard documentation and reporting practices

Support Systems

- Technical support for virtual platform issues
- Regular check-ins with actual academic supervisors
- Peer collaboration opportunities with fellow students
- Resources for extending learning beyond program requirements

Potential Specialisations

- Pharmaceutical Research Track
- Clinical Trials Management Track
- Bioinformatics and Computational Biology Track
- Quality Assurance and Regulatory Affairs Track

Additional Resources for AI in WIL

As this is a rapidly developing space literature is limited. However, there are some pinnacle pieces that have become available and others that may be of interest for reading. They are also not specifically STEM focussed but can be adapted.

The Centre for Research in Assessment and Digital Learning (CRADLE) in conjunction with WIL Australia has just released their Generative AI in Work-Integrated Learning: Resources for university staff, students, and industry partners. It is bound to become a seminal piece of work in this space.

Dean, B. A., Tai, J., Walton, J., Nicola-Richmond, K., & Cormier, D. (2025). *Generative Artificial Intelligence in WorkIntegrated Learning: Resources for university staff, students, and industry partners*. Centre for Research in Assessment and Digital Learning, Deakin University, Melbourne, Australia. DOI:10.6084/m9.figshare.28578638.

There are few other publications that may also be useful relative to AI and WIL at this point in time.

Chugh, Ritesh; Morshed, Md; Sabrina, Fariza; Azad, Salahuddin; Rashid, MD Mamunur; Kaisar, Kaisar; et al. (2025). AI-powered pedagogy: Generative AI as a learning assistant in the ICT discipline. CQUniversity. Report. https://doi.org/10.25946/28561211.v1

Jacoby, D., Savage, S., & Coady, Y. (2024, May). Remote Possibilities: Where There Is a WIL, Is There a Way? AI Education for Remote Learners in a New Era of Work-Integrated-Learning. In *Proceedings of the AAAI Symposium Series* (Vol. 3, No. 1, pp. 478-485). https://doi.org/10.1609/aaaiss.v3i1.31261

Nulton, K., & Fenton, D. (2024). Using work-integrated learning to explore knowledge transfer involving artificial intelligence. In *Refereed Proceedings of the 5th WACE International Research Symposium on Cooperative and Work-Integrated Education, 2024, University West, Sweden*. WACE IRS Proceedings 2024.pdf

Barbieri, W., & Nguyen, N. N. (2025). Generative AI as a “placement buddy”: Supporting pre-service teachers in work-integrated learning, self-management and crisis resolution. *Australasian Journal of Educational Technology*, *41*(2), 34-49. https://doi.org/10.14742/ajet.10035