

# Building a Novel Online Reflective and Connected Curriculum for Environmental Science

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## Abstract

The *Environment in Practice* (EiP) program was introduced within a regional university's Bachelor of Environmental Science to strengthen connections between academic study and career engagement. Environmental science is inherently multidisciplinary, requiring authentic, practice-based experiences to develop collaboration and professional competencies. This need is particularly acute for a growing cohort of mature-age, online learners seeking career and networking opportunities. EiP was designed using Innovation Pedagogy, a Connected Curriculum, and Billett's framework of professional learning to provide a structured, progressive spine across the degree. The program comprises weekly online workshops, an integrated reflective portfolio, and a 20-hour professional placement. Iterative refinements over three years, guided by student feedback, aimed to balance academic rigour with workplace relevance. Survey findings highlighted student appreciation for interpersonal engagement, guest speakers, and authentic workplace experiences, with reported gains in confidence and career readiness. However, responses to reflective practice were mixed, indicating the need for clearer purpose, structured timing, and developmental scaffolding. Preferences for synchronous workshops versus flexible access reflected tensions in delivery expectations, supporting a blended model of strategic live sessions combined with high-quality asynchronous tasks. EiP illustrates a transferable model of applied interdisciplinary education that builds critical thinking, adaptability, and professional competence in environmental graduates.

## Introduction

Designing impactful learning in higher education demands pedagogies that develop both personal and social capabilities, not merely academic knowledge. Approaches such as inquiry-based learning cultivate questioning, deep engagement, and reflective habits that build critical thinking and adaptability (Coffman, 2017; Takeuchi et al., 2020).

Environmental science is inherently interdisciplinary, integrating social, cultural, and ecological perspectives to address complex global challenges. Consequently, effective curricula must connect theory with practice, foreground inquiry and exploration, and emphasise the relevance of learning to real-world issues such as climate change, biodiversity loss, and sustainability transitions. Collaborative curriculum design involving both educators and students has been shown to enhance engagement and ownership of learning (Healey, 2005). Given the accelerating pace and complexity of environmental issues, curricula should also provide authentic, cross-disciplinary experiences that engage industry and policy stakeholders. As students often enter higher education with established worldviews, deliberate opportunities for self-awareness and critical reflection are essential to prepare graduates to contribute

meaningfully to sustainable solutions (Jones & Merritt, 1999). Moreover, written reflection on teamwork experiences has been found to enhance science students' self-perceived communication and teamwork abilities, and strengthen their recognition of employability-related skills (Hiscox, Papakonstantinou, & Rayner, 2022).

The beginning of university is an influential period of self-determination across academic, social, and personal domains. Nieminen and Yang (2024) describe this as student self-formation, a reflexive process of managing life and identity in higher education. Building on humanistic traditions, self-formation repositions curriculum and assessment as tools for reflexivity, inviting students to act as agents in their learning and social contribution (Marginson, 2018). Introductions to disciplinary study should therefore create spaces for critical engagement with knowledge and emerging professional identity.

Bringing inquiry, reflection, and professional preparation together yields a holistic curriculum that engages students, educators, and partners (García-Álvarez et al., 2022). Aligned with Billett's (2018) framework for professional learning, effective education integrates procedural skills with conceptual understanding through authentic participation in practice. For environmental science, this design supports contextual understanding, critical thinking, and interdisciplinary collaboration, preparing graduates for academic success and professional impact (Karakas-Özür, & Duman, 2019).

This paper presents a curriculum stream for a tertiary environmental science undergraduate degree that integrates reflective, inquiry-driven methods with authentic, professionally oriented learning. The program emphasises transferable skills and reflexive practice to advance student self-formation and work readiness. Specifically, we (1) introduce a core, scaffolded module, Environment in Practice (EiP), that spans first to third year in the Bachelor of Environmental Science, and (2) evaluate student perceptions of its effectiveness in fostering lifelong learning, self-awareness, and professional development.

## **Learning Approaches to Enhance an Environmental Science Context**

Environmental science, as a discipline, deeply engages with societal and environmental issues, necessitating pedagogical methods that connect theory with practice. This alignment is critical for fostering students who are not only knowledgeable but also adaptable, reflective, and engaged lifelong learners (Marginson, 2018). The interdisciplinary nature of environmental education demands that students integrate knowledge across fields and apply their learning to real-world contexts.

Reflective and Integrative Learning (RIL) addresses these challenges by encouraging students to critically evaluate their experiences and connect academic learning with personal and societal development. Reflective learning theory highlights learning as intentional, critical engagement with experiences within social contexts (Moon, 2013), while Brockbank and McGill (2006) emphasise the influence of social and experiential factors in shaping learning trajectories. Through reflective practices, such as journaling, portfolio development, and group discussions, students enhance their critical thinking, self-direction, and adaptability. These practices help students make sense of their academic experiences through personal insights and build a foundation for continuous growth in a rapidly changing world.

Reflexive practice complements reflective learning by fostering students' awareness of how academic and social environments shape their development and actions. Marginson's (2018) concept of self-formation aligns closely with this approach, emphasising reflexive agency that enables students to engage critically with knowledge creation and navigate their learning with purpose. In environmental education, embedding reflexive practices helps students appreciate the broader societal implications of their studies and encourages contribution to communities and professions. Learning outcomes, in this sense, extend beyond employability to the public good (Marginson & Yang, 2022).

## **Models for Curriculum Change**

By blending inquiry, reflection, and professional preparation, the curriculum becomes a collaborative journey that actively engages students, educators, and industry partners. This approach aligns with Billett's (2018) comprehensive framework of professional learning across formal and informal contexts, creating a "learning curriculum" that integrates workplace and educational experiences. Their model explains how learning occurs through guided participation in authentic work activities, where novices develop expertise through increasingly complex engagement with professional practices. Central to Billett's framework is relational interdependence between personal and social agency in learning (Billett, 2021): learning emerges through ongoing interaction between learners' histories, motivations, and capacities, and the social practices and cultural norms of professional communities. In environmental education, this is highly relevant, as students navigate complex interdisciplinary knowledge while shaping identities that connect scientific understanding with practical application. Effective professional preparation depends on structured opportunities to engage with authentic problems under the guidance of experienced practitioners. Building on this paradigm, curriculum design is strengthened by integrating theoretical knowledge with practical application through sustained industry partnerships and reflective practice.

One approach that captures this integration is the Connected Curriculum framework (Fung, 2017), which aligns academic learning with professional practice. The framework promotes research-based learning and interdisciplinary connections, ensuring that students engage with

real-world challenges and develop transferable skills. This is particularly relevant in environmental education, where social norms and cultural practices intersect with scientific inquiry. By encouraging inquiry, reflection, and partnerships with industry and community stakeholders, Connected Curriculum fosters a holistic educational experience that prepares students for lifelong learning.

Complementing this framework, Innovation Pedagogy (Konst & Karisto-Mertanen, 2020) strengthens the link between academic knowledge and hands-on projects that address real-world problems. This approach prioritises flexible, student-centred learning environments that accommodate diverse learning styles while cultivating adaptability, critical thinking, and innovation. Through engagement with interdisciplinary issues, students deepen their understanding of environmental science and develop the competencies needed for innovative problem-solving in their careers.

Core themes emerge from these models: integrated knowledge, transferable skills, professional experience, and reflective practice (Table 1). Knowledge integration combines theoretical understanding with practical skills and professional communication, moving beyond disciplinary boundaries to link academic theory with real-world applications. Transferable skills development builds on this foundation by cultivating personal initiative and collaborative teamwork. Through research skills and real-world problem-solving, students develop critical thinking, innovation, and adaptability. Professional experience provides the authentic context where knowledge and skills converge through meaningful practice; a progressive journey from guided participation to independent professional practice, supported by industry partnerships and community engagement. Reflective practice weaves throughout, embedding self-directed learning and peer collaboration through inquiry-based reflection on learning outcomes. This systematic approach fosters self-awareness and adaptive learning through reflective journals, field journals, peer review, and professional development planning, ultimately creating meaningful connections between learning experiences and professional growth.

**Table1: Core Theme Comparison and application to learning in Environmental Science**

<i>Theme</i>	<i>Billett's (2018, 2020) Frameworks</i>	<i>Connected Curriculum (Fung, 2017)</i>	<i>Innovation Pedagogy (Konst &amp; Karisto-Mertanen, 2020)</i>	<i>Environmental Science Application</i>
<b><i>Knowledge Integration</i></b>	Combining Theoretical understanding, Practical skills, Professional communication	Interdisciplinary connections across subjects	Academic theory, Practical application	Scientific principles, Field methods, Professional communication skills
<b><i>Transferable Skills Integration</i></b>	Personal initiative, Collaborative teamwork skills	Research skills, Real-world problem solving	Critical thinking, Innovation, Adaptability	Data analysis, Interpretation, Stakeholder engagement
<b><i>Professional experience</i></b>	Guided participation → Independent	Industry partnerships,	Hands-on projects with	Environmental research practice and

<b><i>Reflective/Reflexive Practice</i></b>	professional practice	Community engagement	external collaborators	work placements
	Self-directed learning, Peer collaboration	Inquiry-based reflection research outcomes	Self-awareness, Adaptive learning processes	reflective journals, self review, Professional development planning

## Study Context and Student Demographics

This study focuses on the Bachelor of Environmental Science (BENSC) at a regional university in New South Wales. The degree serves on-campus and off-campus cohorts taught synchronously. On-campus students learn via weekly face-to-face lectures, tutorials, and practicals; over 80% matriculate within 12–24 months of school. Off-campus students include recent school leavers and mature learners, many with environmental sector experience. They study theoretical content online via recorded lectures and resources, with practical skills reinforced through face-to-face intensive schools held 2–3 times per year. From 2022–2024, off-campus enrolments dominated (~95%); in 2024, 89% were over 25 years and 71% studied part-time. Fifty-three percent identified as female and 47% as male.

The BENSC was revised in 2022 using Innovation Pedagogy for Applied Science (Konst & Karisto-Mertanen, 2020) and the Connected Curriculum (Fung, 2017). Billett's (2009) professional learning model was embedded to emphasise the interplay between learners' histories, motivations, and community practices. A strategic element, Environment in Practice (EiP), spans first to third year via EiP1 (100 level), EiP2 (200 level), and EiP3 (300 level), linking activities across units to foster continuity, peer community, reflective and reflexive practices, and industry engagement.

Initially, each EiP unit ran as a year-long offering (two 13-week blocks). After two years, engagement and progression concerns prompted a shift to trimester delivery (one 13-week block). All EiP units are delivered online for both cohorts, with a lighter study load: one 1-hour weekly online workshop and a progressive assessment including a portfolio of weekly reflective pieces and online oral presentations.

### EiP Curriculum: Thematic Structure Across EiP1–3

The sequence from first to third year is designed to scaffold student development from an initial interdisciplinary orientation through to professional readiness. This progression is articulated through weekly topics embedded across four overarching themes: degree planning and knowledge foundations, reflective practice, transferable skills, and spotlights on career or post-study experiences, which includes explicit skills training to support students in navigating employment (Table 2). These themes draw on the models proposed by Billett (2018), Fung, (2017), and Konst & Karisto-Mertanen, (2020, Table 1), providing a structured framework that integrates disciplinary knowledge with the development of professional and transferable competencies.

#### ***Degree Planning and Knowledge Foundations***

EiP1 establishes purpose and academic planning, emphasising scientific literacy (week 3), quantitative methods and chemistry (week 4), and Indigenous ways of knowing (week 6).

Students explore majors, practise academic communication, and plan progression (weeks 9–11). EiP2 consolidates orientation into intentional pathway planning (e.g., week 2, Enviro Science: The Big Picture) and anchors choices in professional standards (week 10, Environmental Law, Ethics, and Decision-Making). EiP3 mobilises these foundations for applied problem-solving and career-oriented synthesis.

### ***Reflective Practice***

Reflection is introduced in EiP1 (week 2) as a core learning strategy and portfolio practice. EiP2 reframes reflection for workplace learning using structured cycles (week 3) during a 20-hour placement, integrating supervisor feedback, field logs, and reflective memos. EiP3 translates experiential reflection into public, employability-oriented narratives evidencing growth and readiness.

### ***Integrated Reflective Portfolio for Assessment***

A learning portfolio operates as the integrative backbone across themes and years. Tasks embed reflective practice with staged artefacts assessed formatively and summatively, supporting metacognition, autonomy, and a growth mindset (Fernsten & Fernsten, 2005; Chan & Lee, 2021; Santangelo, Cadieux, & Zapata, 2021). Artefacts progress from degree planning and foundational literacies (EiP1) to placement-based evidence and ethics/WHS (EiP2), to employability outputs: CVs, competency statements, and career narratives (EiP3), producing reflective, evidence-informed graduates (Woodward & Nanlohy, 2004; Choi-Lundberg et al., 2024).

### ***Transferable Skills Development is systematic***

EiP1 builds information and communication skills (weeks 3 and 10) and critical appraisal/peer teaching (week 12). EiP2 advances evidence communication in contested spaces (week 4), research fluency (week 5), and applies capabilities during the 20-hour placement: professional communication, time management, teamwork, ethical decision-making, and WHS/data compliance. EiP3 converts capability into outputs: persuasive competency statements and CVs (weeks 6 and 10) and applied problem-solving products (weeks 11 and 12).

### ***Career Spotlight/Life After Undergraduate***

Industry engagement intensifies across the program. EiP1 orients students to majors and futures. EiP2 deepens role/sector insight through Career Spotlight sessions and a placement that enables networking and role-fit testing. EiP3 adds “Life after BENSC” sessions (e.g., government agencies, consultancy) and workshops that integrate insights into coherent trajectories, culminating in evidence-based job searches and applications or advanced career planning.

**Table 2. Thematic Structure across EiP1-3. Degree planning & foundations; Reflective practice, Transferable skills, Career spotlight / Life after BENSNC, Navigating Employment.**

<i>Week</i>	<i>EiP1</i>	<i>EiP2</i>	<i>EiP3</i>
1	Why Study Enviro Science? What do you expect? What is your vision of success?	Second year challenges and reflections, Enviro Science: where to from here?	Discussion and support for degree completion
2	Reflective practice; building a portfolio of learning	Enviro Science: The Big Picture	Life after BENSNC: course work and research options
3	Library and information literacy toolkit for effective learning	Reflective practice for workplace learning	Student led discussion – reflections on Work Experience/ Volunteering placements
4	A broad foundation – Why Quantitative Methods and Chemistry are in the core	Enviro Science in the digital age: sci comm, denialism, and AI	Life after BENSNC: Government agencies, Guest speaker
5	Question everything? Science and the media	Advanced information literacy skills	Life after BENSNC: Environmental Consultancy – Guest speaker
6	Different ways of knowing? (indigenous learning frameworks)	Career spotlight: Guest speaker	Planning for careers: Key competencies for graduate career progression
7–8	Intensive schools and mid trimester break	—	—
9	About the Majors (Academics champion the 4 major themes)	Career spotlight: Guest speaker	Life after BENSNC: Guest speaker
10	How to give a great talk (and a not so good talk)	Environmental Law, Ethics and Decision-making	Writing persuasively for your CV and employment futures
11	Sell me your major (student presentations)	Career spotlight: Guest speaker	Exploring industry problems through connecting experience and learning
12	Teaching others a concept and revision skills	Career spotlight: Guest speaker	Stand out from the Crowd Workshops – Career Narrative presentation/s
13	Degree planning: Capstones & Careers	Wrap-up	Wrap-up

## Survey Methods

After a 3-year cycle of the EiP modules, we conducted an anonymous and voluntary survey of students who had completed the second and third year of study, including an integrated work placement. The aim of the survey was to evaluate student perspectives, and it was approved via the university Human Ethics committee (HE24-072). The survey sought to understand student experiences and perspectives on the module, exploring overall benefits and challenges. The key themes include:

- **Student Background and Enrolment** – Understanding when students enrolled in EiP1, their study mode, and prior experiences.
- **Unit Content and Learning Experience** – Assessing whether course content met student expectations, clarity of workshop materials, relevance of workshops to student needs, and effectiveness of the mix of presentations and activities.
- **Program Structure and Delivery** – Gathering feedback on unit, the usefulness of Portfolio collation for workshop activities and reflections, the effectiveness of online delivery, and student opinions on a shift from yearlong to trimester-long formats.
- **Flexibility and Accessibility** – Examining the value of the synchronous online mode workshops for flexibility and whether the delivery structure of the EIP supported student learning.
- **Work Placement/Volunteering** – Investigating participation in the work placement experience, their perceived value in skill development, career goal refinement, and real-world application of learning.
- **Opportunities for Improvement** – suggestions for enhancing the overall content and delivery of the EiP.

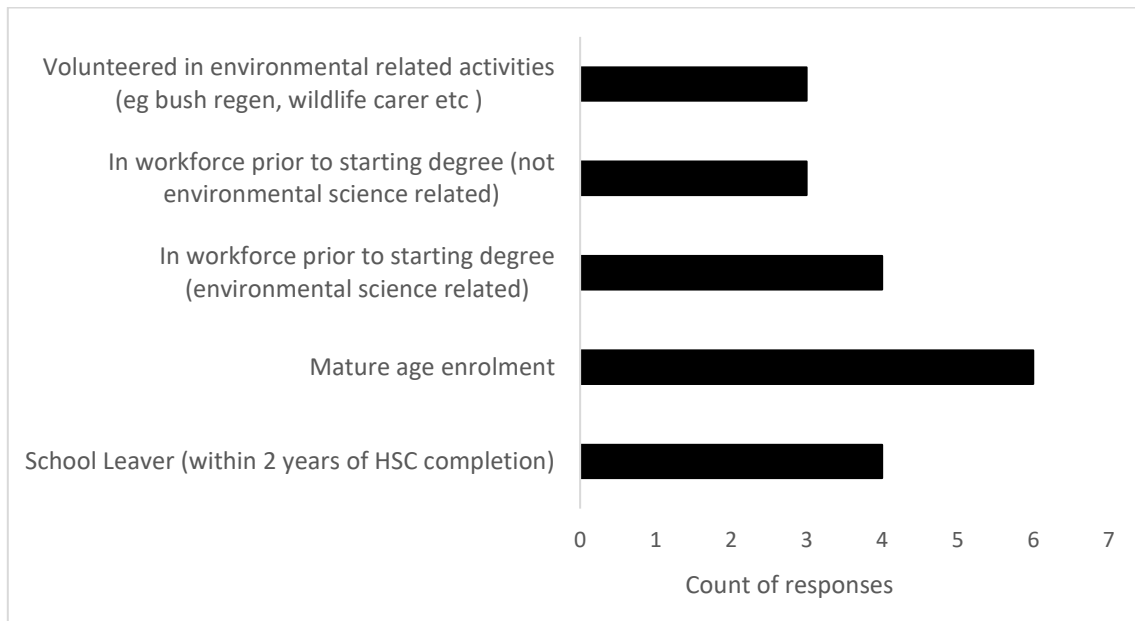
At the time of the survey, there were 38 students enrolled in EiP1, 24 in EiP2, and 14 in EiP3 (total 76). Students received the survey link via university email. No reward was offered for participation. The survey was open for 4 weeks, with 2 email reminders sent during that period, and a total of 11 students responded (15% response rate). Most questions were optional, and most respondents did not answer every question. Many questions also allowed more than one answer and, as the survey was fully anonymous, we were unable to identify longitudinal responses at the individual level. These statistical limitations prevented us from presenting robust quantitative results as evidence of broader patterns, but we used both quantitative and qualitative data from the surveys to validate and strengthen findings through cross-referencing (Creswell, Clark, Gutmann, & Hanson, 2003). Qualitative responses were assessed to gain nuanced insights into specific aspects of the EiP experience, using inductive contextual interpretation within a constructivist framework (Boblin, Ireland, Kirkpatrick, & Robertson, 2013). We present a synthesis of survey responses below as a way of exploring student perceptions of the effectiveness of the novel EiP module.

### Student perceptions of the Environment in Practice module

#### *Characteristics of the EiP cohort survey respondents*

Of the respondents (n = 11), 6 students began the EiP during their first trimester of enrolment, while 4 students had already completed at least one trimester of their degree prior to commencing the EiP. More student respondents were enrolled in the online cohort (n = 9) than in the on-campus cohort (n = 2). The majority of student respondents (n = 7) identified as mature age and were currently or previously in the work force across environmental and non-

environmental industries (Figure 1). Four respondents were enrolled within 2 years of completing secondary school, reflecting the low school leaver enrolment in the overall degree.



**Figure 1: Diverse student backgrounds, reflected in responses to the question ‘Please tick all which align with your background on commencing the BENSC’. Note that students were able to choose more than one option.**

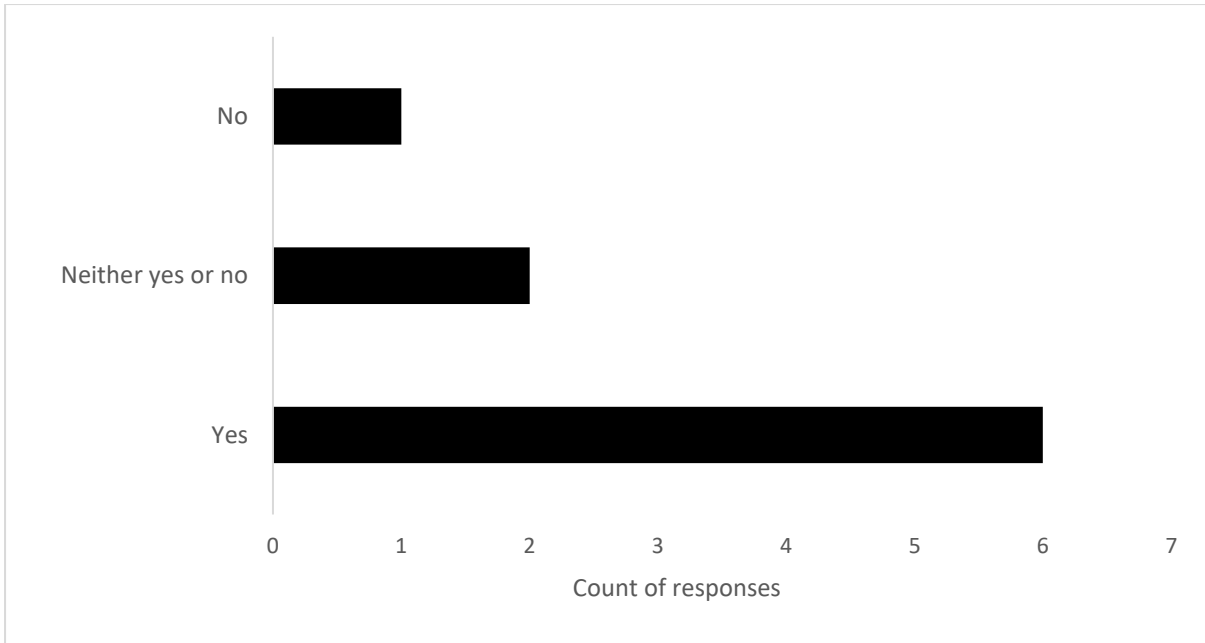
#### ***Unit Content, program structure. Delivery and accessibility***

Flexibility provided by online delivery was widely valued (Figure 2). Real-time discussions enhanced learning for some students, but most students engaged with the content recording at a later time, either by choice or because they were unable to attend the live session. Anecdotal interactions during teaching sessions indicated that some on-campus students felt disadvantaged by online-only mode for this unit, while some mature-age students in the workforce (enrolled as online students) found the scheduled weekly interaction unnecessary.

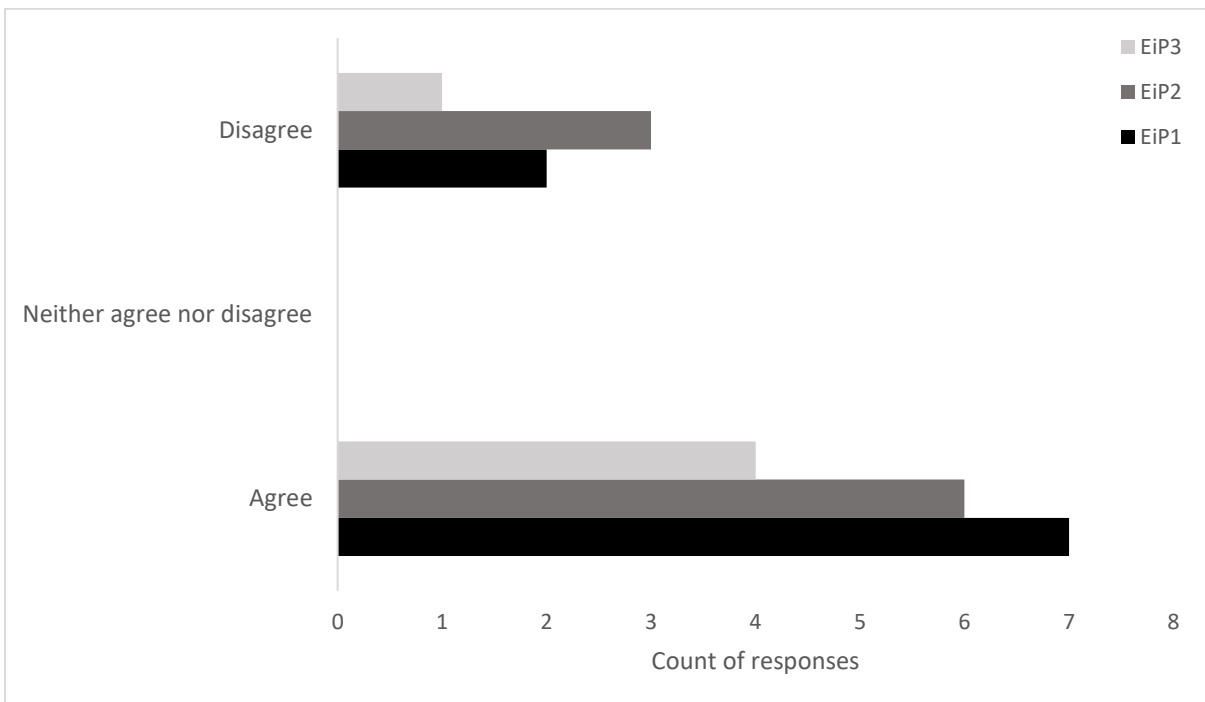
Relevance of workshops was broadly appreciated: 7 out of 9 respondents for EiP1 and 6 out of 9 for EiP2 thought workshops were highly relevant to their learning needs and background. Most students also agreed that the EiP unit content had valuable application to their overall university study (Figure 3).

#### ***Work placement***

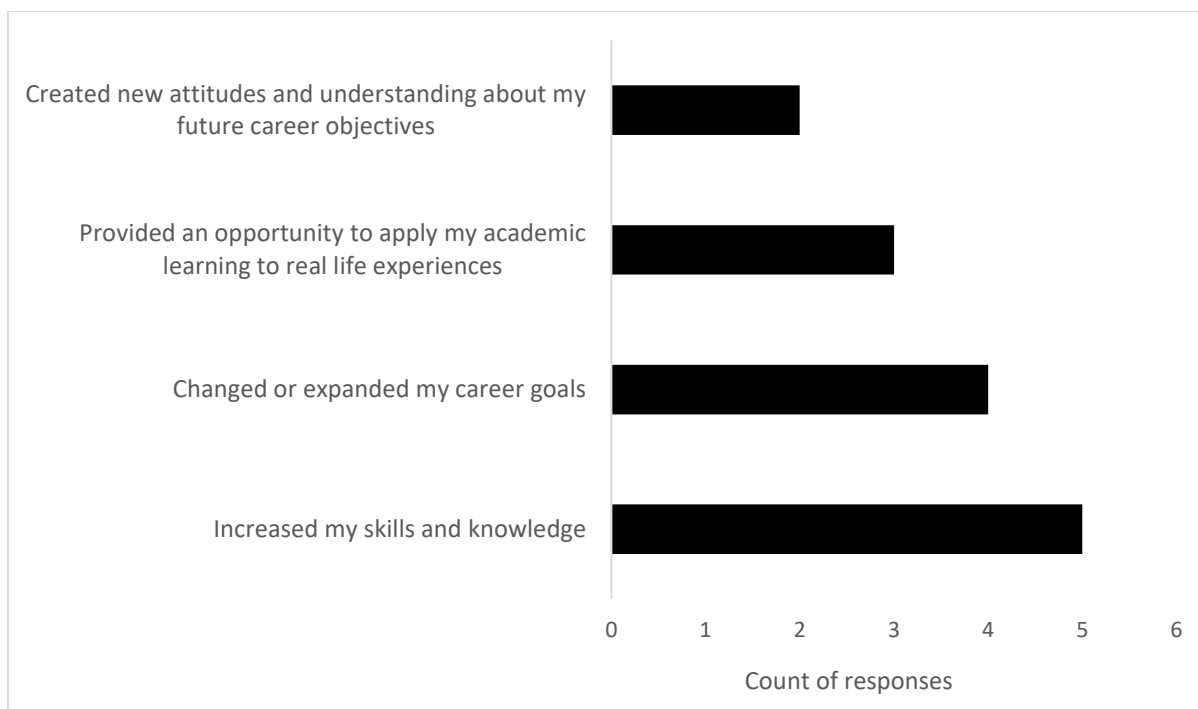
A total of 8 (out of 11) respondents had completed their work placement at the time of the survey, and 5 of these responded with further detail indicating they recognised the value in the experience (Figure 4).



**Figure 2: Student responses to the question “Did you find the online delivery of these units valuable?”**



**Figure 3: Student responses to the prompt “I was able to apply what I learned in the workshops and activities to my overall university study”.**



**Figure 4: Approximately three-quarters (73%) of responding students had completed the work placement. This figure shows responses from that subset of students to the question ‘Please tick all that apply regarding your volunteering experience’ (n = 5).**

#### *Qualitative themes emerging from textual responses*

The most valuable aspects of the EiP were identified manually through thematic analysis of the longform responses to questions asking students to state the most and least valuable aspects of the unit (between 7-10 responses to each question). Most responses identified interpersonal interactions (group engagement and guest speakers) as the most valuable aspect. Other responses valued aspects that enhanced career readiness (work placement and resume writing). The online format and delivery of units, particularly the shift of EiP2 to a single trimester, were positively received, though timing issues affected some students’ ability to engage fully. Support and connection, especially for online students, were highlighted as beneficial, with synchronous meetings, peer discussions, and structured engagement opportunities helping to mitigate feelings of isolation. The following student response identified key benefits of both the online experience and the connection with industry:

*“The meetings and one-on-one discussions with [the degree coordinator] and fellow peers is greatly beneficial, especially for online students who at times can feel disconnected from the University. Guest speakers are also incredibly valuable resources... Being able to listen to outside perspectives, be it companies or environmental matters of interest...”*

However, perceptions of relevance varied. Some students found the EiP useful, especially EiP1, when taken at the right time, with a part-time student commenting “[EiP1] would have been helpful had I done it in my first year.” Other students, particularly those already in the industry, felt the EiP was unnecessary (*pers comm* from student who was working in the environmental industry and resided outside of Australia). Workshop timing also influenced students’ perceived value, and those unable to attend sessions live via Zoom found the unit less beneficial. This highlights a key equity challenge involved in balancing online teaching to suit staff and student needs. Night-time or after-hours live online engagement may suit off-campus students who work full-time, but may not suit staff who need to prioritise family commitments.

Identifying ways to engage all online students through a live forum remains a key challenge. For example, this could involve negotiating shorter individual sessions, or less frequent mandatory sessions that students can plan ahead for and align with work breaks or leave if needed.

A key theme in the responses identifying the least valuable aspects of the EiP was the perception that the time commitment for the unit was not worth the benefits students gained. Responses included mixed perceptions of the reflection tasks, with some students finding them beneficial in the long term, while others felt that weekly reflections were unnecessary. Additionally, several students expressed frustration with the mandatory nature of the EiP, particularly those who had already developed their own study techniques, were further along in their degree or had industry experience. This perception is illustrated in the response:

*“Please consider [recognition of prior learning] for work placement particularly for students who already have full-time jobs working with the environment. Not trying to get out of doing something altogether and I would be more than happy to be given an alternate assessment task.”*

In contrast, some students also desired more depth in tasks, suggesting that longer and more complex reflection activities might enhance engagement and overall value, in responses such as *“Having more opportunities for engagement ie. more workshops, more mandatory engagement opportunities and longer reflection tasks”*, and that *“the tasks in the reflections could have been longer and more complex”*. In relation to the reflective writing tasks, again responses were mixed, especially regarding the frequency of assessment topics, with one student response explaining that *“Reflective writing is good, but not weekly, I find it becomes a chore”* while another wrote *“I personally know that in 10 years, these reflections will be the most valuable takeaway from my study.”*

## **Discussion**

This study evaluated student perceptions of the Environment in Practice (EiP) program, a scaffolded first- to third-year curriculum integrating reflective inquiry-driven methods with authentic professional learning in a Bachelor of Environmental Science. The findings reveal both promise and challenges, particularly for a predominantly mature-age off-campus cohort.

### **Achieving dual goals: self-formation and work readiness**

The EiP program fostered professional development, with students valuing interpersonal engagement, guest speakers, and career-readiness activities. High satisfaction among those who completed work placement validates the authentic learning approach. However, divergent responses to reflective practice, from *“most valuable takeaway”* to *“becomes a chore”*, reveal the complexity of promoting self-formation alongside employability (Moon, 2013; Marginson, 2018).

Students experience STEM higher education as more than academic training; they view it as a pathway to achieve personal and professional growth, make positive societal impact, and address real-world challenges. When STEM programs help students achieve both personal goals (like career advancement and independence) and community-focused goals (like making a positive difference in society), and when learning connects to real-world situations, students show greater motivation, confidence, and persistence in their studies (Harackiewicz, Smith, &

Priniski, 2016). The EiP's integration of workplace experience with reflective practice aligns with this evidence, though implementation requires refinement to fully realise these benefits. While student suggestions provide valuable insights, educators must synthesise this feedback with pedagogical expertise, scholarly evidence, and industry preferences when reviewing and amending curriculum (Lin-Stephens, Manuguerra, & Uesi, 2018).

### **Knowledge integration through scaffolded learning**

The scaffolded structure showed increasing effectiveness across year levels, with student responses from EiP3 achieving greater positive responses than in the earlier units. This progression validates the developmental approach, though a couple of students reported limited relevance across all levels. Timing within degree progression proved critical as EiP1 was most beneficial when taken early, while experienced students found content redundant without Recognition of Prior Learning (RPL) pathways (Roy, & El Marsafawy, 2021). The weekly synchronous workshop model, departing from standard asynchronous delivery, created engagement barriers for work-committed students, highlighting tensions between pedagogical ideals and practical constraints.

The cohort profile with predominantly mature-age students with varied employment backgrounds necessitates flexible, inclusive design. While most students valued online flexibility and appreciated the ability to engage with unit content in their own time, some of those unable to attend synchronous sessions felt disadvantaged, raising engagement challenges. Balancing competing needs and availability of teaching staff and different types of learners is an ongoing challenge for online education generally. Recorded alternatives help but may reduce the interpersonal connection valued by isolated learners. Opportunities to address this could involve shifting the EiP focus from live discussions to content and tasks where students can engage with peers and staff asynchronously (eg Forum discussions, chat tools).

The findings support a deliberately blended model combining strategic synchronous sessions with high-quality asynchronous resources and peer networking opportunities (Stone & Springer, 2019; Moore, Dickson-Deane, & Galyen, 2020). This approach maintains knowledge integration and skill development while ensuring inclusive access for time-poor, working, and geographically dispersed students.

### **Building transferable skills through authentic experience**

Students valued developing practical skills through real-world experiences, with most survey respondents completing placements and finding them valuable for building employer-sought capabilities. However, students already employed in environmental fields expressed frustration at mandatory placements: *"Please consider RPLs for work placement particularly for students who already have full-time jobs working with the environment."* This feedback conflicts with authentic learning principles that programs should 'build' upon existing knowledge (Ashford-Rowe, Herrington, & Brown, 2014).

The latest iteration of EiP3, post survey, successfully integrated RPL into career exercises and assessment, and was highly valued by industry-employed students. This validates alternative pathways including workplace portfolios, supervisor evaluations, or projects applying academic concepts to current roles (Roy & El Marsafawy, 2021; Raciti, Tham & Dale, 2024). Students were, however, divided on the requirements of reflection tasks with some wanting frequent check-ins, others preferring deeper, less frequent tasks. This suggests benefits of

differentiated approaches: quick skill checks for first-year students, detailed workplace reflections for second-year students, and comprehensive professional planning for final year students (Brockbank & McGill, 2006). Such flexibility would better serve both ‘school leavers’ and ‘career-changers’ needing structured support, and experienced professionals requiring recognition of existing expertise (Raciti *et al.*, 2024).

### **Evolving reflective practice to meet diverse needs**

Reflective practice for assessment generated varied responses, indicating refinement rather than fundamental flaws. While some students recognised profound long-term value, others struggled to fit weekly reflections into busy schedules. This diversity points to two constructive pathways forward. First, better communication about how reflection directly supports career development may increase engagement by helping students articulate skills to employers, identify growth areas, and make informed professional decisions (Quinton & Smallbone, 2010). Second, tailoring reflection activities to developmental stages ensures meaningful engagement: shorter guided reflections building foundational habits in EiP1, workplace-specific critical incident analyses in EiP2, and comprehensive professional synthesis in EiP3. This scaffolded approach ensures reflection remains manageable while developing a valuable career-long skill (Bruno, Galuppo, & Gilardi, 2011).

Structured reflective practice is particularly valuable in Environmental Science, enabling students to engage critically with complex systems, consider societal and ecological implications, and develop purpose while building adaptability, collaboration, and critical thinking (Turns *et al.*, 2014). By persisting with refined reflective practice through the EiP, the degree prepares graduates who are competent, thoughtful, adaptive, and capable of contributing meaningfully to environmental solutions.

### ***Implications for curriculum refinement***

- EiP1: Prioritise early enrolment; provide RPL awareness; use shorter, structured reflections with clear feed-forward purpose
- EiP2: Strengthen placement by developing explicit briefs linking theory to practice; implement fortnightly reflections with peer collaboration; offer flexible synchronous alternatives
- EiP3: Maintain authentic industry aligned deliverables; enable optional advanced tasks; use reflexive synthesis to reflect on problem-solving approaches while integrating concepts from multiple scientific disciplines.

### **Study limitations and next steps**

The study had several important limitations. With only 11 respondents from a predominantly mature-age, off-campus cohort, findings should be generalised cautiously. The low response rate, small enrolments, and variable part-time participation in years two and three may have produced self-selection bias, with volunteers tending toward extreme views (Nulty, 2008). Respondents probably had very positive or very negative experiences, obscuring the middle ground. Such bias limits understanding of typical student experiences and may overemphasise non-representative problems or successes (Fosnacht *et al.*, 2017).

Without broader participation, the survey’s capacity to guide curriculum improvement was constrained. To address this, future evaluations should adopt proven strategies by embedding modules and run targeted focus groups by enrolment mode and RPL status (Saleh & Bista,

2017); triangulate surveys with portfolio analytics, LMS data, and supervisor feedback (Gašević, Dawson, & Siemens, 2015), and test whether adjusting reflection frequency and live-session timing improves access and fairness. A mixed-methods approach combining regular check-ins, adaptive surveys, and learning analytics can create inclusive, real-time feedback loops that support continuous improvement essential for responsive curriculum development (Lodge & Corrin, 2017).

## Conclusion

The BENS degree program was revised for release in 2022, drawing on Innovation Pedagogy for Applied Science (Konst & Karisto-Mertanen, 2020) and the Connected Curriculum approach (Fung, 2017). Innovation Pedagogy emphasises flexible, student-centered learning that links academic knowledge with applied, real-world projects, while Connected Curriculum integrates research-based learning and interdisciplinary engagement with industry and community. Together, these approaches foster inquiry, adaptability, and professional skills development. To complement this, Billett's (2009) model of professional learning was embedded, highlighting how learners' personal histories, motivations, and capacities interact with the practices and cultural norms of professional communities. This integration ensures that students not only build scientific knowledge but also develop reflective, adaptive professional identities. By combining these frameworks, the program provides authentic, practice-oriented learning experiences that prepare graduates for the interdisciplinary challenges of environmental science and equip them to contribute effectively to addressing global environmental change.

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