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An innovative and meaningful scaffolded curriculum approach to Environmental Health education in Western Australia

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There has been a critical shortage of qualified Environmental Health Officers (EHOs) both globally and in Australia that has plagued the profession for decades. At Edith Cowan University (ECU), Perth, Western Australia, an undergraduate degree in Environmental Health (EH) was developed in 2006, however, viability was problematic, and the course was under threat of closure. In 2016 both the EH and occupational safety and health (OSH) majors were due for re-accreditation and since there was significant overlap between the two courses both majors were revised and combined into one (Occupational and Environmental Health and Safety). This new qualification has subsequently been accredited by Environmental Health Australia (EHA), as well as the Australian OHS Education Accreditation Board (AOHSEAB) and the British Institution of Occupational Safety and Health (IOSH). The new dual accredited course has had excellent graduate outcomes and provides graduates with the flexibility to move between traditional OHS and EH roles. In some smaller local governments, and in industry, ECU graduates have been employed to work in both roles. The curriculum was developed in consultation with industry and has an embedded year-long diploma course that consists of eight units (subjects/courses) that prepare graduates to work in a support role to EHOs. The Diploma of Environmental Health course is a scaffolded course that is embedded in the degree, and it has been recognized by the State Government as a qualification leading to appointment as authorized officers under the *Public Health Act 2016* (WA). The diploma is more than a pathway course as it is a stand-alone qualification that leads to gainful employment. Most students now enroll in the diploma, initially and gain employment as a Technical Officer, and then progress on to complete the EH degree on a part-time basis while employed in the profession. The diploma is also an exit option for students who struggle with the academic requirements of some of the more traditionally difficult units such as physics, chemistry, and statistics and the EH degree is now a viable university course with excellent graduate employment outcomes.

KEYWORDS

Environmental Health, scaffolded, curriculum, pathways, Australia

1 Introduction

There is a global problem with regards to the declining Environmental Health (EH) workforce and this matter has been the focus of international debate among the EH profession, local government authorities and discipline academic community for more than two decades (Whiley et al., 2018; Oosthuizen et al., 2022).

In 2006, 11 of 37 states in the USA reported a shortage of environmental health graduates with vacancy rates of 11%, and staff turnover at 12%. The problem in the USA was compounded by one in four Environmental Health Officers (EHOs) being eligible for retirement. In Australia, the situation was even bleaker. The Department of Human Services in South Australia (SA) reported that 39% of the state's metropolitan EHOs believed they would be leaving the profession in less than 5 years and many positions were not being filled due to a shortage of EH graduates. The situation in regional areas of SA was much worse with 46% of staff indicating their intent to leave the profession over the next 5 years. Moreover, 13% of staff in regional SA at the time were over 60 years of age, 58% were over 50 and it was generally accepted by the EH Faculty globally that the only way to reverse this concerning trend was to increase the supply of graduates (Cromar, 2006). However, more than a decade later, Whiley et al. (2018) still reported an on-going critical shortage of EHOs in SA, which meant that the state was failing to meet current regulatory requirements and was unable to address emerging EH issues such as the impacts of climate change on public health (Rocque et al., 2021). The EH curricula in Australia cover the appropriate content and students are well prepared to combat emerging public health issues but when they enter the workplace, they get bogged down by routine inspections that generate revenue, regulatory work, and responding to complaints, which is a priority for local government agencies. Most local councils also do not have the resources to employ dedicated staff to address these issues. It was concluded that there were not enough students enrolled in environmental health degrees to reverse the trend.

Environmental Health Australia (EHA), first established in 1935, is recognized in Australia as the peak professional association representing the interests of EH in Australia (Smith, 2008). To practice as an EHO in Australia, it is necessary to complete an EHA accredited undergraduate or postgraduate qualification (Dunn et al., 2018). University processes to develop courses and change curricula to meet accreditation requirements (Environmental Health Australia Ltd, 2014) are cumbersome and costly procedures that require a significant investment in terms of staff and resources. Universities operate on business principles and course viability is a constant issue that EH courses in Australia, and world-wide, must contend with because student enrolments in EH courses are generally low. Despite a global workforce shortage, EH is still not a well-recognized profession. University course coordinators, state governments and EHA frequently lobby universities to keep courses open, despite low enrolments, as there is a very real workforce demand, however, this is not a key measure of program viability. Strict accreditation requirements and the prescriptive nature of the accredited courses usually require universities to develop EH specific units (subjects/courses) that are not valued as electives by students from other disciplines, and the courses also do not allow for flexibility in terms of the inclusion of elective choices, these factors all impact viability. Although universities value professionally accredited courses, the accreditation process should not be so onerous that it jeopardizes

course viability, and courses also need to remain flexible enough to allow for some variations that can support specific areas of specialization to reflect the unique niche areas of expertise at certain universities (Oosthuizen, 2009).

EHOs are generally employed in the third tier of government, deployed at a local level, and are a key component of the public health workforce. Local government EHOs enable their councils to fulfill their statutory obligations. In Australia, there are 537 local governments, of which 65% are deemed to be regional or rural councils (Dine et al., 2022). In Western Australia (WA), EHOs were recently surveyed and reported high rates of "burnout" (Oosthuizen et al., 2022). Given the state already has low numbers of EHOs, this is also a matter of concern as the higher turnover rates associated with the profession further impact workload pressures on EHOs and so the need to produce more graduates is even more critical (Oosthuizen et al., 2022). The EH profession and all involved in the employment and education of EH graduates agree with the need to attract and enroll more students into EH degrees, however, little attention has been given to interrogating the existing pedagogical frameworks applied at the tertiary levels to evaluate their effectiveness or otherwise.

2 Methods and results

Due to the shortage of EHOs, current officers are overwhelmed with regulatory compliance work and dealing with complaints from the public. It was hypothesized that a substantial proportion of these duties could be delegated to suitably trained Technical Officers (TO) working under the supervision of qualified EHOs. Leveraging on ECU's approach to the development of knowledge as a course learning outcome based on Bloom's Revised Taxonomy and learner-centered educational paradigms (Gupta, 2022). This approach is based on the Constructivism Theory (Beck and Kosnik, 2012; Fosnot, 2013) which posits that students are able to find out, build and change knowledge as they begin to own it, making it possible for independent application in diverse contextual settings.

During 2017 the concept of creating a new level of EH professional was discussed with EHA and the University course advisory committee and, although there was some support, mainly from the larger local governments, there was also a great deal of resistance. Many EHOs were concerned that their positions would be threatened and that they may be replaced by TOs. To explore this issue further the Perth-based Metropolitan Environmental Health Management Group (MEMG) was invited to hold one of their regular quarterly meetings at ECU. The first hour of the meeting was devoted to a focus group discussion with EH Managers ($n=24$) to explore their views on creating a new Diploma of Environmental Health and to identify and reach consensus on tasks that could be performed by a TO. Although this group was known as the "Metro" health managers, there was also a representative from the country town of Bunbury and this member represented the South-Western EHO group.

During the discussion it became apparent that many councils already employed TOs, but they had no regulatory authority and no formal training, they were essentially trained "on the job" to perform certain support roles. The EH Managers who already had a role for TOs were asked to email the course coordinator their job (position) descriptions for these positions and these were compared and

integrated with the feedback from the focus group to create the combined list of tasks and skills as shown in [Table 1](#).

A summary of key selection criteria was extracted from advertised positions for environmental health technical officers and these are summarized in [Table 2](#).

The outcomes from this focus group investigation provided the motivation needed to lobby for the establishment of a one-year (fulltime) EH Diploma that was embedded in the EH major and so provided scaffolded skill development as articulated by Vygotsky's Zone of Proximal Development ([Shabani et al., 2010](#)) from Technician to fully qualified EHO as is demonstrated by the Course learning outcomes in [Table 3](#).

To further enhance the marketability of the diploma it was submitted to the WA Department of Health's EH Professional Review Board for endorsement and then it was submitted to the WA Government with a request to allow graduates to be appointed under the *Public Health Act 2016 (WA)* as authorized officers to perform a range of duties under supervision of a qualified EHO, these include:

Food and water sampling programs

- Coordination and implementation of potable, coastal and bore water sampling programs.
- Coordinating and implementing non-legal food sampling programs (in accordance with the *Food Act 2008 (WA)* requirements).
- Surveillance of aquatic facilities.

Mosquito surveillance and control

- Larval monitoring.
- Adult mosquito trapping.
- Mosquito control operations.

Low risk premises inspections

- Regular and recorded surveillance of low risk commercial premises such as hairdressing salons, skin penetration establishments and beauty therapy premises.
- Low risk public buildings surveillance, as assessed under the Department of Health (WA) Risk Classification of Public Buildings Guideline, to ensure compliance with relevant legislation.

General duties and low risk EH complaints

- Initial assessment of complaints in relation to community noise, pests, smoke, litter, illegal discharges, asbestos and other environmental health related matters as they arise.
- Conducting assessments of premises to be demolished to assess rodent baiting and potential asbestos risks associated with the demolition.
- Assisting in the assessment, prevention, control and management of environmental health risks within the community.

Industrial audits

- Conducting initial assessment of industrial premises to ascertain compliance with relevant environmental protection and pollution control legislation, standards and codes of practice.

Health education

- Provision of technical and specialist environmental health related information and advice to other departments and the public in accordance with documented procedures of the enforcement agency.
- Provide verbal and written advice and information on environmental health issues to owners of businesses, the community, and government departments in accordance with good customer service practices.
- Providing support, education and information on a broad range of environmental health issues.
- Assisting with the development and delivery of health promotion material.

Approval for the appointment of diploma graduates as statutory officers was granted in 2019 and this initiative was an excellent outcome for both the profession and the University as is evidenced the enrolment and completion data ([Table 4](#)).

Most students in the diploma course gain employment in a local government health department and then change their enrolment to part-time.

2.1 Occupational and Environmental Health (OEHS) Major (2018-current)

In 2018 both the EH and (OSH) majors were due for re-accreditation, and this presented a unique opportunity to review both courses. Despite excellent graduate outcomes and employment opportunities, enrolments in the EH specific units were still low and course viability again became an issue due to these subject-specific low enrolment units. Since there is significant overlap between the two professions it was deemed appropriate to develop a new major that would prepare students for roles in both EH and OHS.

During September 2018, two separate Focus Group sessions were held with key informants from both the OHS and EH professions, and their recommendations were presented to both the EH and OHS Course Consultative Committees of the university. After receiving approval to proceed, the recommendations and suggestions from these industry focus group sessions were analysed and a new combined Major in OEHS was developed. The course has subsequently gained full accreditation from Environmental Health Australia (EHA), as well as the Australian OHS Education Accreditation Board (AOHSEAB) and the British Institution of Occupational Safety and Health (IOSH). As shown in [Table 5](#), the new dual accredited course (OHS and EH) has had excellent outcomes in terms of increased enrolments and graduate outcomes, providing graduates the flexibility to move between traditional OHS and EH roles and in some smaller local governments ECU graduates have been employed to work in both roles at their local government councils.

There has been good flow on from the diploma to the degree course. [Figure 1](#) shows the number of EH/OEHS major enrolments has increased more rapidly since the introduction of the diploma course in 2017 suggesting that it is providing an attractive introduction option for students, who then go on to complete the full bachelor qualification.

TABLE 1 Focus group outcomes EH Technician and Position descriptions (combined).

Potential tasks identified by the focus group	Combined summary of existing position descriptions To assist EHO to enforce EH legislation, Council local laws and related policies, guidelines and procedures including;
Water sampling (pools, potable, ocean)	Coordination and implementation of potable, coastal and bore water sampling programs and surveillance of public aquatic facilities (swimming pools, spas, hydrotherapy etc.).
Mosquito surveillance	Duties and tasks associated with mosquito management such as; pre and post treatment larval monitoring, adult mosquito trapping; larviciding operations, application of mosquito control products through a range of ground-based application equipment, water sampling to assess physical, chemical and microbiological parameters, and other specific projects in mosquito control, maintenance and update of various databases, mosquito borne disease follow up.
Low risk premises (skin penetration/ hairdressers)	Regular and recorded surveillance of low-risk commercial premises such as hairdressing salons, skin penetration establishments and beauty therapy premises.
General duties and low risk EH complaints	<ul style="list-style-type: none"> • Ensuring that the Health Laboratory is kept clean and tidy. • Assisting EHOs in the field as required. • Assisting the EHO with enforcement and compliance. • Witnessing procedures for legal compliance. • Accompany EHOs to comply with duty of care and working alone policies. • Investigating complaints in relation to community noise, pests, smoke, litter, illegal discharges, asbestos and other environmental health related matters as they arise. • Assisting in the assessment, prevention, control and management of EH risks within the community. • Caravan Park and low risk public buildings onsite inspections to ensure compliance with relevant legislation.
Industrial audits	Conducting inspections of industrial premises to ensure compliance with relevant legislation, standards and codes of practice.
Food - basic low risk, not statutory powers, labeling and sampling	<ul style="list-style-type: none"> • Coordinating and implementing food sampling programs. • Assisting EHOs to enforce legislation, local laws and related policies, guidelines and procedures.
Health education	<ul style="list-style-type: none"> • Provision of technical and specialist health related information and advice to other departments and the public. • Provide verbal and written advice and information on health issues to owners of businesses, the community, and government departments in accordance with good customer service practices. • Providing support, education and information on a broad range of environmental health issues. • Assisting with the development and delivery of health promotional material.
Vermin and pest infestation/control	Implementation of pest control programs and provision of technical information and health promotion advice to the general public in relation to pest control programs.
Pre - demolition inspections/asbestos	Conducting inspections of premises to be demolished to assess rodent baiting and potential asbestos risks associated with the demolition.
Admin support	<ul style="list-style-type: none"> • Budget monitoring, obtaining quotes for equipment and supplies, raising purchase orders and process accounts for pest control and the public litter bin programs. • Provision of administrative, clerical and data entry support to health services staff. • Responding to public counter, telephone and written enquiries relating to EH compliance and miscellaneous matters. • Providing high standards of customer service and assistance with problem solving. • Managing computerized record systems relating to complaint and compliance matters. • Maintaining registers and databases (card and computer memos) to ensure optimum use • Data entry and report on the performance of EH processes as directed. • Prepare licences and approvals under the Health Act and Regulations. • Develop and maintain knowledge and appreciation of Health Legislation relevant to the position. • Ensure licences and invoices are compiled, issued and support the collection of annual fees. • Raise purchase requisitions as required. • Process development applications as required. • Prepare correspondence and reports as required. • Provide administrative support to the Health Services Team, including: preparation of letters, memoranda and other correspondence, compile statistical information as requested and preparation of publications and presentations regarding EH matters. • Researching and compiling information as required by Health Services staff.

TABLE 2 Summary of key selection criteria for TOs (generic skills required).

<ul style="list-style-type: none"> • Ability to undertake field-based operations. • Developed problem solving techniques, negotiation and conflict resolution skills. • Developed verbal and written communication skills. • Sound negotiation, decision making and analytical skills. • Sound time management and organizational skills. • Sound interpersonal skills. • Ability to work autonomously and as part of a team. • Good computer skills including Microsoft Office. • Ability to work independently and as part of a team. • Experience in the collection, recording and management of data. • Experience in the use of financial systems, including raising requisitions and invoicing. • Experience in assisting the review and development of systems, policies and procedures. • Ability to relate with senior staff, other employees and customers demonstrating a high standard of customer service. • Knowledge of workplace health & safety obligations and duty of care including diversity, access and inclusion. • Ability to practice discretion, judgment and confidentiality. • Ability to work with limited supervision and under pressure.
<p>Additional certifications</p> <ul style="list-style-type: none"> • Current First Aid Certificate or an ability to obtain • Current “C” Class driver’s license • Completion of a Department of Health Mosquito Control course

TABLE 3 Course learning outcomes for the ECU Diploma in Environmental Health and the Bachelor of Health Science degree in Occupational Environmental Health and Safety.

CLO’s diploma	CLO’s degree
1 Apply specialized environmental health knowledge to technical and theoretical situations.	1 Apply broad discipline knowledge to a range of theoretical and practical occupational health and Safety (OHS), workplace health and safety (WHS) and environmental health situations.
2 Communicate environmental health knowledge, theoretical concepts and ideas to others.	2 Think critically to analyse, interpret and conceptualize complex OHS, WHS and environmental health problems.
3 Show initiative and personal responsibility to plan, coordinate and evaluate environmental health projects and perform complex technical operations with independence.	3 Use digital technologies and literacies to access, evaluate and synthesize relevant information from multiple sources.
4 Think critically to analyse and synthesize environmental health information from multiple sources to evaluate unpredictable problems.	4 Communicate disciplinary knowledge and values in professional and public contexts.
	5 Think creatively to anticipate challenges and generate OHS, WHS and environmental health specific solutions/responses.
	6 Demonstrate a global outlook with respect for cultural diversity, including Indigenous cultural competence.
	7 Work collaboratively and demonstrate initiative to implement social, sustainable, and ethical values.
	8 Demonstrate autonomy, accountability and judgement for own learning and professional practice.

2.2 Student feedback

Students who have studied the OEHS Major at ECU reported via student testimonials that the multiple pathways for employment were a key factor in choosing this course. Additionally, multiple accreditations were another factor that motivated students to pursue this field of study. The innovative approach by ECU to introduce the dual qualification OEHS undergraduate degree, the only one of its kind in Australia, has definitely improved their employability in both sectors. This approach can be referred to as multiskilling of graduates who will be able to offer over and above what is expected in the workplaces where they will end up being employed. By being more flexible and adaptable in their workplaces, these graduates bring significant benefits to employers and also are better placed to enjoy better job enrichment satisfaction opportunities, an attribute postulated by Herzberg’s Two-factor Theory (Rai et al., 2021). The need for these multiskilled workers was highlighted during the world’s response to the Covid-19 pandemic when several employees in any discipline with a modicum of health training were assigned to take charge of infection control duties in the absence of suitably qualified personnel (Oosthuizen et al., 2022).

Students also reported that practicum and workshop learning were valuable in terms of exposure to career context and diverse networking opportunities within industry. Practicum learning or Work Integrated Learning (WIL) is an integrated process of EH training in Australia, and a national accreditation requirement for all graduates to complete before their graduation (Environmental Health Australia Ltd, 2014). When designing the dual qualification degree in OEHS, ECU decided to go over and above the national minimum WIL requirements by introducing a face-to-face workshop designed to impart practical skills and knowledge to students to use the various environmental health hazards monitoring equipment in investigating real work exposure scenarios. All the instrumentation sessions are delivered by industry professionals who are able to impart real work knowledge to the students and to prepare them for employment. Furthermore, these practical sessions provide active engagement and experiential learning in accordance with Kolb’s Experiential Learning Theory (Morris, 2020), helping in the acquisition of skills and their transferability to the real world.

Students collectively reported in testimonials that they enjoyed the diverse modes of study, being on-campus at both Joondalup or the South-West (Bunbury) campus, supporting students’ sense of ‘belonging.’ ECU also offers the option for flexible and independent learning that off-campus enrolments allow, for those students who wish to study online. This feedback attests to ECU’s passion to deliver exceptional learning outcomes for students. By providing the flexibility of online learning for students who are unable to study EH courses full time on campus due to remoteness, family commitments and work demand, the university has managed to bring equity in the training of EH personnel. This approach has provided support for self-directed training and learning in the EH field as stated by Knowles’ Andragogy theory (Chan, 2010).

Another key factor highlighted in the students’ testimonials, was the development of interpersonal skills that aided students to adapt their communication style to meet the needs of diverse audiences. Practical skills of this nature heightened their ability to transfer and adapt theoretical learning into practical application in the workplace.

TABLE 4 Diploma of Environmental Health student enrolments (2017–2023).

	2017	2018	2019	2020	2021	2022	2023
Enrolled	5	5	9	16	29	25	11
Completed		1	1	3	5	11	*

*2023 Completion data is not yet available.

TABLE 5 Occupational Environmental Health and Safety degree enrolment data 2019–2023.

Student category	2019	2020	2021	2022	2023
Enrolled	2	11	9	15	24
Completed	2	2	0	3	1*

This number does not include 2023 Semester 2 data which is not yet available.

This feedback attests to the university's commitment to prepare its graduates to be able to secure employment in a range of working environments, training them to participate in employment interviews; and to practice professional conduct to enhance employability. All students studying the health science degree are required to undertake a minimum of 75 h of practicum with an employer in their area of study. It is worth noting that one student highlighted the assistance received to overcome a disability while learning. The lecturing staff across the OEHS major; with the support of the university's Access and Inclusion team, was invaluable to this student while undertaking their studies at ECU.

3 Discussion

Edith Cowan University is a relatively new university that was established in 1991 in the Northern suburbs of the Perth Metropolitan area in Western Australia. As a new university in a relatively small city that has five universities (four public and one private) it was important for ECU to distinguish itself from the other well-established universities and ECU strives to provide industry-relevant teaching and research. ECU courses are developed with graduate employability as a key focus, and they are designed and regularly reviewed in consultation with industry. Teaching staff at ECU have extensive industry-based experience and networks. Work integrated learning placement opportunities, as well as fieldwork, and practicums are important aspects of ECU courses, and key to enable students to develop important employability skills to function effectively in the work environment (Jackson, 2013a,b). Such a student-centered approach, essential for student retention and success (Taylor, 2013) has been rewarded as the university has received five-star ratings for undergraduate teaching quality for the last 17 years consecutively (Edith Cowan University, 2023).

Environmental health officers provide a core public health service, and EH is a profession that is in high demand globally with a long-recognized skills shortage. Despite the demand, EH is not a popular career choice for school leavers and many people come into the profession later in life with several post graduate courses now on offer (Cromar, 2006; Dunn et al., 2018; Whiley et al., 2018; Oosthuizen et al., 2022). One of the first undergraduate degree courses that was developed at ECU was the BHLthSc and this course offered a minor in Environmental Health which was not accredited by EHA, and so did

not lead to employment as an EHO. In the early years, the BHLthSc attracted more mature age students than school leavers and these students were studying to improve their employment prospects, so it was decided in 2006 to develop an accredited EH program in collaboration with EHA and the local EH fraternity. Although the previous versions of EH teaching had been delivered in the School of Biomedical and Health Sciences, by a relatively junior academic with an EH background, the degree was established in the School of Science. Many of the senior academics involved with the course design were environmental scientists, and they did not have a clear understanding of the role of EHOs as part of a Public Health team, this influenced the direction of the course, and it became too focused on environmental management, which meant that the course ended up being a 4-year long degree. In Australia, all undergraduate EH degrees are 3-year courses and so this placed the course at a distinct disadvantage, and it never was viable, producing only two graduates. This initiative consumed significant resources and the School of Science decided to archive it. The lesson learned from this failed initiative is the fact that EH academics were not driving the process and there were too many senior staff in power positions and with vested interests including irrelevant curriculum content, hence the course lost its Public Health focus. The course should have been located within the health discipline. It is an EHA accreditation requirement (Clause 4.6), that the coordinator of the course should be a qualified EHO and member of the association (Environmental Health Australia, 2014), yet the only EHO on staff was employed in a different school.

The suite of EH courses that were developed since 2011 have been immersed in the EH profession from the very start and the program was developed to meet EHA accreditation requirements with significant input from a highly engaged industry consultative committee and several targeted focus group discussions. The WA Government Department of Health, and the Department of Water and Environmental Regulation were also part of the course development process, their inclusion from the outset ensured that the course met the statutory training requirements of the regulators.

EH degrees offered at universities in Australia were targeted at high school students who were required to achieve the minimum Australian Tertiary Academic Ranking (ATAR) requirements to study at university, which is a number between 0.00 and 99.95 (Universities Admission Centre, n.d.). This number reflects a student's relative position to others falling in the same age bracket. The major disadvantage of such a system is the possible exclusion of students who, due to other extenuating circumstances may fail to achieve the required score for university entry, yet given the opportunities, may well proceed to successfully complete any university course and enter the environmental health profession.

Furthermore, the results of the focus group discussion with practicing EHOs indicated that several cadres employed as TOs in local government were already carrying out some EHO duties, albeit without formal qualifications not currently offered in Australia's

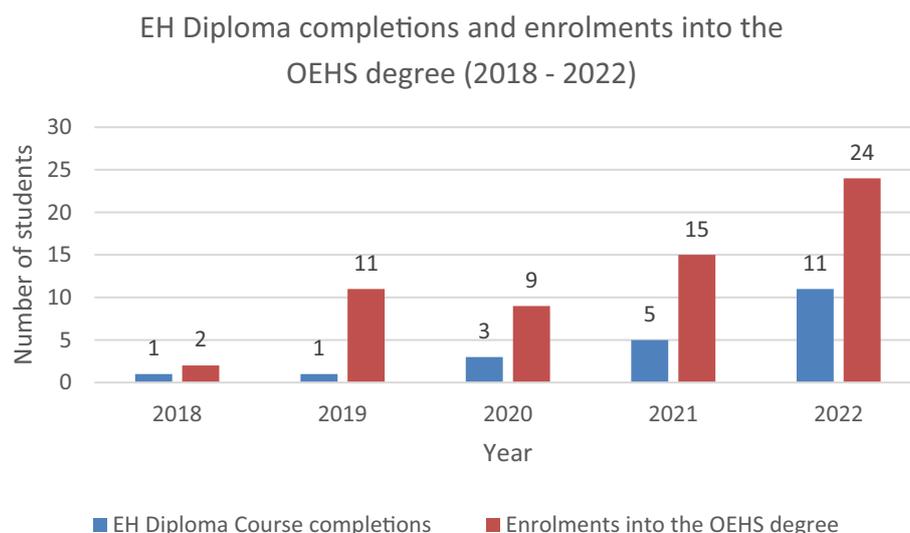


FIGURE 1

Environmental Health (EH) diploma completions and enrolments into the Occupational Environmental Health and Safety (OEHS) degree.

Vocational Education Training (VET) sector. Edith Cowan University interrogated the pedagogy of teaching students who enter university through alternative pathways by investigating the benefits achieved through the examination of diverse learning styles, motivations, and prior educational experiences. These are criteria that would suit the TOs, and other students who could benefit from an alternative pathway to study EH at university level. By leveraging on their different backgrounds in the workplace and society, it became possible to achieve active learning and student engagement as these students leverage on their practical knowledge and experiences. This approach concurs with the principles of the constructivist theory of learning (Steffe, 2012, p. 12–22; Beck and Kosnik, 2012; Fosnot, 2013).

The development of an embedded diploma proved to be highly successful, and a key driver of its success is the fact that it was designed from the outset to fulfill certain statutory duties, this enhanced employment outcomes, while providing the alternative pathway for students into the EH undergraduate degree. Providing alternative university entrance pathways to students offers manifold benefits, especially to those professions looking to build talent pools and innovative approaches to satisfying their broader goals. By coming together with diverse personal, educational and work experiences, these talent pools are able to learn and benefit from each other in their quest for understanding according to the social constructivist theory (Steffe, 2012, p. 12–22). These pedagogical approaches employed by ECU have ensured the success of the alternative pathway to EH education for over 100 students since its inception.

A unique opportunity presented itself when both the EH and the OHS majors were due for re-accreditation in the same year. This allowed for the development of a combined major that was dually accredited in both EH and OHS. The new combined major of Occupational and Environmental Health and Safety, alongside the embedded Diploma of EH, has proven to be extremely successful and enrolments have increased. Most students opt to complete the diploma first, scaffolding their learning and discipline competencies before progressing to the full degree on a part-time basis as many will gain employment through completing the diploma. This strengthens

student understanding and command of tasks requiring the application of complex concepts since the process is able to offer a well-planned support framework that dovetails with each student's level of proficiency, agreeing to a greater extent with Vygotsky's Zone of Proximal Development (Shabani et al., 2010). This approach can assist students to sequentially assume responsibility, independence in decision making and the ability to retain the knowledge gained over a longer period.

Academic programs such as EH and paramedicine rely on academic staff who have significant industry based practical experience to teach in undergraduate programs and this presents a dilemma during recruitment. Universities generally only employ PhD qualified staff, and so many EHOs who would be excellent lecturers are unable to apply. It is extremely important for professional degrees to have academic staff who have experience as practitioners and who are well connected with the profession, indeed the Tertiary Education Quality and Standards Authority (Tertiary Education Quality and Standards Agency, 2023) deem this essential that "academic staff and leaders have the qualifications and capacity needed to teach students in relation to the nature and level of expected learning outcomes." Over the last 20 years, the complement of EH qualified academics at ECU has developed from one Lecturer (level B) to now include an EH qualified Professor and two EH qualified lecturers in full time positions (compliment of 3). This staffing complement provides sufficient critical mass to represent EH related training, research, and engagement activities. The EH academics are well integrated with the OHS complement that consists of several fulltime and sessional lecturers. Reflecting the larger OHS critical mass of staff, the OHS programs are offered both at undergraduate and postgraduate levels and include a specialist post graduate degree in Occupational Hygiene. There is a lot of cross-discipline teaching and a strong collegial and supportive culture that also enables the team to function effectively. Drawing upon the specialist expertise of the staff the ECU suite of EH/OHS offerings are deemed to meet industry demands and to support an industry relevant research program with several Research Master and PhD students solving real world problems in applied research programs.

4 Conclusion

Although universities, particularly new institutions, value professionally accredited courses, the external accreditation process can be extremely onerous and resources intensive. Highly specialized courses also often have issues with course viability as they are not flexible, and profession specific units are not popular electives. Development of introductory courses that are well supported by industry and perceived as easy to access by prospective students, such as the nested diploma level qualifications and a dual accredited major, can go some way to ameliorating the perceived barriers to university entry for people pursuing professional based degrees from diverse backgrounds. To allow this to develop organically, universities need to ensure that discipline specific courses are developed by academic staff who have industry experience, and they need to provide strategies to recruit staff who may not yet have PhDs to be supported to acquire higher degrees by allocating time and support for them to do so. It is imperative that academic staff need to be experienced practitioners and well connected to their profession as industry engagement is a key factor in the development of courses that meet the demands of the profession and accrediting bodies, particularly important is the inclusion of the regulators who appoint EHOs as statutory officers for a range of duties under public health and environmental legislation. It is also important for accrediting bodies to allow universities to have some flexibility to develop specific areas of specialization that reflect unique niche markets, and allow for a level of academic freedom to develop curriculum in areas of strength of the academic teams. This innovative approach to introduce an alternative entry pathway into the EH degree, coupled with the novel approach to offer the dual qualification of the OEHS undergraduate degree has enhanced the viability of the EH courses, and significantly contributed to the crippling shortage of EH qualified personnel in the industry.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

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