Threshold Learning Outcomes for Environment and Sustainability

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Version and Release Notes

This is **version 0.8.1**, and includes **limited, minor amendments only** to **version 0.8** (the consultation draft) of the threshold learning outcomes (TLOs, see page 3) for Environment and Sustainability, released for comment from stakeholders in Australian tertiary Environment and Sustainability education. **Version 0.8** was prepared by the Project Team, reviewed by the Project's Reference Group, and was released for the first phase of public consultation through June-July 2014, which comprised a number of face-to-face workshops nationally. The second phase of the public consultation will run through August-September 2014 and will comprise online discussion forums and invitations to targeted stakeholders to provide comments. Details of the project including its consultation phase and of the project overall are available at the project website: http://environmentltas.gradschool.edu.au/.

Version 0.9 of the TLOs (the piloting draft), revised on the basis of stakeholders' comments, will be piloted against a range of diverse Environment and Sustainability qualifications offered by Australian tertiary education providers in late 2014.

After piloting and presentation to the Australian Council of Environmental Deans and Directors (ACEDD) for their endorsement, **version 1.0** will be released as part of the *Learning and Teaching Academic Standards (LTAS) Statement for Environment and Sustainability* and available for use from early 2015.

Support for this project has been provided by the Australian Government Office for Learning and Teaching. The views expressed in this document do not necessarily reflect the views of the Australian Government Office for Learning and Teaching.

Introduction

Threshold learning outcomes (TLOs) for Environment and Sustainability are presented in draft form (page 3) for consultation with stakeholders in the field of Environment and Sustainability. The TLOs are intended to apply to qualifications in Environment and Sustainability offered by tertiary education providers nationally. The TLOs were drafted by the Project Team and then critically reviewed by the Project's Reference Group, comprising: Professor **Greg Hill**, (Chair), Vice-Chancellor, University of the Sunshine Coast, Dr **Aidan Davison**, University of Tasmania; Dr **Anna Hurlimann**, University of Melbourne; Dr **Dimity Podger**, Barasa Consulting Group; Professor **Pierre Horwitz**, Edith Cowan University; Associate Professor **Michele Rosano**, Curtin University; Professor **Steve Turton** (ACEDD President's Nominee), James Cook University.

Environment and Sustainability: The scope of the field

Environment and Sustainability is a coherent field of teaching, learning and research, but not in the traditional disciplinary sense. Environment and Sustainability as a field addresses a set of concerns that are shared across many individual disciplines, spanning the full breadth of the natural and social sciences and the humanities (e.g. from environmental science, and engineering, through to human ecology and environmental management, planning, law, history and philosophy). The field includes education *about* the environment and sustainability, as well as education *for* the environment and sustainability.[1]

The Environment and Sustainability field is distinctive through a combination of three key characteristics. First, the field gives attention to relationships between human societies and the Earth system. Education in this field (i) involves learning fundamental aspects of society-nature interactions and interdependencies in relation to their present and future conditions, and (ii) supports learners to develop skills required to influence transformation for sustainability.[2] The field addresses interconnections between social, environmental and ecological dimensions of social justice,[3] sustainability and resilience.[4]

Second, the field values transdisciplinarity. Transdisciplinarity encourages a shift in perspective that includes *and* extends beyond single traditional disciplines: this approach recognises that responses to 'wicked'[5] sustainability challenges (challenges that have conflicting definitions, causes and a difficult resolution) lie beyond individual disciplines.[6] The field thus encompasses and synthesises the contributions of many disciplines and seeks to draw academic knowledge into dialogue with other forms of knowledge. Contemporary environment and sustainability thinking engages with complexity,[7] uncertainty[8] and cross-scale interdependencies, is creative, and searches for new, more integrative ways of understanding the world.[9]

Last, the field is also characterised by its focus on futures. A relatively consistent intent of sustainability is to ensure the viability of human societies and ecological systems into the future.[7] Decision-making for sustainability therefore makes links between our actions in the present and their impact in the future.[10] It orientates the actions of those in the field to one of envisioning and negotiating more positive futures.[2] The Environment and Sustainability field acknowledges uncertainty and seeks to prepare graduates with skills and attributes that are adaptable for decision-making across a broad range of possible futures.[7,11]

Threshold Learning Outcomes for Environment and Sustainability

Upon completion of a bachelor degree with a major in Environment and Sustainability, graduates will be able to:

Domain	Threshold Learning Outcome
Transdisciplinary Inquiry	1. **Demonstrate transdisciplinary understanding of interdependencies between human societies and environments by:** 1.1. recognising that knowledge is socially constructed and interpreted 1.2. identifying, collating and applying evidence from diverse sources 1.3. considering diverse perspectives, interests and values in identifying and conceptualising environmental and sustainability challenges.
Understanding Complexity	**2. Demonstrate understanding of complexity by:** 2.1. applying systems thinking 2.2. explaining uncertainty and interactions across scales 2.3. identifying and analysing key environmental and sustainability challenges and responses.
Skills for Environment and Sustainability	3. **Demonstrate skills in:** 3.1. thinking critically and creatively to envision, design and evaluate alternatives for sustainable futures 3.2. collaborating as a team member and/or leader in learning, analysis, decision-making and action 3.3. communicating with diverse audiences in varied contexts.
Professional, Civic and Personal Responsibility	4. **Demonstrate capacity for ethical professional, civic and personal conduct**: 4.1. as a practitioner of learning and transformation 4.2. in decision-making and action grounded in an ethos of sustainability 4.3. through continuing reflection, and intellectual development.

Learning for Sustainability

Learning for sustainability involves cognitive (knowledge and its application) learning as well as higher order affective learning (relating to values, behaviour/actions and attitudes which emotionally involves the learner).[4,10,12,13,14] Affective learning progresses from basic skills (e.g. a willingness to listen, to read and to acquire information) to more advanced skills (e.g. self-reliance, an ability to cooperate and lead).[14,15,16] These affective skills are especially important for unknown futures where learning 'has to be understood neither in terms of knowledge nor skills but of human qualities and dispositions'.[15]

Secondly, learning for environment and sustainability implies learning for change and transformation.[11] Environmental education and engagement activities which develop students' capacity to think critically and their capacity to innovate and implement solutions are likely more effective than merely knowing and understanding in addressing complex sustainability challenges.[17,18] This requires deep learning - that which uses independent thinking and the ability to organise and structure a wide range of information types into a coherent whole as a result of comprehending the underlying meaning.[19]

For these reasons learning for environment and sustainability needs to be active, experiential and participatory.[2,20] Active learning challenges the concept that the teacher or lecturer is the wholly authoritative source of knowledge and realigns the role of educators as facilitators and participants in the learning process.[11] It encourages learners to question assumptions and dominant ways of thinking through their educational journeys and participate in learning and decision-making.[2] It means that learning is interactive, experiential and learner directed[11] thereby empowering both the cognitive and the affective skill sets that they will require to respond to a future which is likely to present novel and unknown challenges.[21] By using active learning approaches, learners tackle authentic issues,[11] thus modelling the decision-making processes that they are likely to undertake in their roles as professionals and citizens beyond graduation.[14]

Active, participatory learning also encourages the sharing of multiple perspectives, the confrontation of bias[2] and building positive relationships.[11] This collective or social learning is reflective and allows both cognitive and affective learning to take place in informal and more formal settings. Participatory learning is best supported when it facilitates the sharing of different knowledge and understanding but also accounts for different learning styles. Learning undertaken in this way goes beyond environmental literacy or sustainability awareness and allows people to understand the systemic way in which the world works, the fundamental changes required at all levels[2] and promotes active citizenship for empowered change.[4,11]

Although this pedagogy is by no means constrained to learning for environment and sustainability (i.e. it is highly valuable to traditional disciplinary learning also), it is explicitly within this framework of teaching and learning[4] that the TLOs for Environment and Sustainability are presented.

Notes on Threshold Learning Outcomes for Environment and Environmental Sustainability

Table 1 provides detailed explanatory notes to the TLOs. The table also includes brief notes on the alignment between these TLOs and student attributes specified in the Australian Qualifications Framework.[22]

Table 1: Explanatory notes to the Threshold Learning Outcomes for Environment and Sustainability

Transdisciplinary Inquiry **1. Demonstrate transdisciplinary understanding of interdependencies between human societies and the Earth system by:**	• This TLO aligns with the Australian Qualifications Framework (AQF) student attribute related to knowledge that 'Graduates of a Bachelor Degree will have a broad and coherent body of knowledge'; however, as opposed to the AQF which expects this knowledge to have 'depth in the underlying principles and concepts in one or more disciplines as a basis for independent lifelong learning' this TLO expects a transdisciplinary or beyond disciplinary understanding from graduates. • Transdisciplinarity strategies to teaching and learning in this field encourage a shift in perspective that includes and extends beyond single traditional disciplines: this approach recognises that responses to 'wicked'[5] sustainability challenges (issues that have conflicting definitions, causes and a difficult resolution) lie beyond individual disciplines.[6] Transdisciplinarity involves defining research questions using insights from a range of relevant disciplines. Research is addressed by developing a new and shared understanding which synthesise disciplinary understandings through collaboration. A transdisciplinary approach differs from single-, cross-, multi- and interdisciplinary approaches as discipline boundaries recede and new explanations and understandings are created.[9] Bounded transdisciplinarity describes inquiry limited to scholarly disciplines, whereas unbounded transdisciplinarity may also draw on other types of knowledge including Indigenous, expert and lay knowledge.[6,23] • Inquiry based learning centres the student in the active or participatory process of their own learning. Inquiry based learning, for instance, involves the student in defining the issue as the starting point to applying skills, clarifying attitudes and values, and understanding how to participate effectively in more sustainability futures.[24]
1.1 recognising	• Knowledge and information (acquired through scientific and other methods) is socially constructed – the meaning it is given is influenced by the social or cultural context. Knowledge and information can be influenced by the underlying assumptions made when it is collected or interpreted. These assumptions are, in turn, affected by the values, interests, and past experiences of both those who collect the information and those that interpret and use it.[4] For instance, different people can collect data or be affected by knowledge about the same topic and come to very different, sometimes conflicting conclusions depending on a wide range of factors such as their worldviews, cultures, interests and past experiences.[25] • Understanding and recognising how knowledge is constructed or derived, who generated the knowledge and how, provides critical context for working towards environmental solutions. This is because it enables graduates to understand where and why conflicts occur and where common ground occurs. • Disciplinary knowledge can contribute to an understanding of some aspects of a problem. Indeed, graduates will need to understand the importance of scientific and academic knowledge.[3] However, because disciplinary knowledge is also socially constructed, it is important for graduates, not only to understand different disciplinary perspectives, but also to understand how this contributes to and is implicated in constructed knowledge.
1.2 identifying, collating and applying evidence from diverse sources	• It is important that graduates know how to access (i.e. where and from whom) relevant and reliable data[26] as well as being able to interpret and act on data in such a way that it is professional, appropriate and effective.[10] • Change for sustainability needs to be supported by scientific evidence;[3] however, the use of scientific evidence is not enough to fully inform decision-making towards more sustainable futures. Decision-making for highly complex issues will have a more reliable evidence base if it includes that from diverse origins (including the physical, social, economic, political, ethical, cultural, traditional, Indigenous, aesthetic and the spiritual).[11,26,27,28] The importance of building on the personal experience and local perspectives of those participating in decision-making is also an important basis for transformation[11] and is also an important source of evidence.

1.3 considering diverse perspectives and values in identifying and conceptualising sustainability challenges.	• Each of the different sources of evidence provides its own perspective of a given situation. Combining knowledge from different sources allows the possibility of seeing situations in a new light. Firstly, if the process of participatory or collaborative learning[27] is done skilfully and reflectively, participants can better understand the limitations and assumptions behind their own understanding of a situation so that they can individually see it differently. Secondly, the actual combination of different types of knowledge collectively, allows the possibility of understanding the situation in an entirely new way that is fresh and different. Together the combination of different perspectives can provide a more valuable understanding of the actual situation than a single perspective can. Bringing the different sources of evidence together is a mark of sustainability education.[27]
Understanding Complexity **2. Demonstrate understanding of complexity by:**	• This TLO aligns with the Australian Qualifications Framework student attribute related to knowledge that 'Graduates of a Bachelor Degree will have a broad and coherent body of knowledge'; however, as opposed to the AQF which expects this knowledge to have 'depth in the underlying principles and concepts in one or more disciplines as a basis for independent lifelong learning' this TLO expects a transdisciplinary or beyond disciplinary understanding from graduates.
2.1 applying systems thinking	• In essence, systems thinking is about seeing the big picture.[2,7] Systems thinking differs from disciplinary thinking which tends to separate out and focus on discrete aspects of a particular issue–otherwise known as reductionist thinking.[10] • Systems thinking is critical for addressing the growing number of complex or 'wicked' problems[5] – problems that exceed the capacity of traditional approaches to resolve them. Such complex issues entail disagreement, contestation and different social perspectives and values. They are also highly dynamic, unpredictable, and inherently political.[29] • Lack of systems thinking is a characteristic limitation of decision-making for sustainability[29] where traditional 'silos' of isolated knowledge commonly inform the decision-making process.[2] This makes systems thinking particularly important for current and future tertiary graduates. Without it, sustainability cannot be more successfully addressed[30] because decision making will continue to address the symptoms rather than the underlying core drivers which are often not constrained to one particular discipline.[2] Applying systems thinking allows us a better understanding of the root causes and drivers of complex issues.[3]
2.2 explaining uncertainty and interactions across scales	• The influence of scale and its consideration is integral to the success of understanding systems. Many global issues can result from cumulative and/or iterative smaller scale local impacts and vice versa. Therefore, the consideration of physical/geographical scales, from local to global, is critical. Temporal scales are just as important because it is critical to understand the interdependence of current, past and future generations.[11] The characteristics of a particular issue are the culmination of that system's evolution and adaptation over time to the changing geographical context; just as the decisions we make now will determine how sustainable our future is. Understanding environmental history and its relevance to the present is, therefore, critical. Lastly, the scale of human social systems as they interact with natural systems (e.g. the organisational scale) is also critical, for instance, to understand the linkages between the environment and humans, and between rich and poor.[11] • An understanding that systems are dynamic, changing and uncertain has implications for informing a response[16] in the face of incomplete knowledge. Sustainability as a concept is also similarly dynamic in the context of this complexity.[4,11] With growing interconnectedness and increasing rates of change there is greater unpredictability. Furthermore, some issues are ambiguous and depend on the interests, values and worldviews of stakeholders or institutions. Lastly, sustainability issues must be resolved with incomplete knowledge – 'we don't know what we don't know'.[29] This results in the possibility of surprises and shocks. • Being able to 'explain' requires graduates to explicitly articulate knowledge and understanding which contributes to 'authentic student learning'. Having to defend arguments to peers enables the formation, awareness, development and refinement of thought[31] which precedes deeper learning.

2.3 identifying and analysing key sustainability challenges and responses.	• Environmental issues themselves can no longer be considered in isolation from one another.[32] Issues such as climate change, water shortages and biodiversity loss have common drivers and each of their outcomes impact one another.[32,33] Graduates should exhibit knowledge across a wide range of environmental and sustainability issues and be able to explain their interconnectedness.[3] • Graduates should exhibit an understanding that natural systems have limits and approaching or exceeding these limits will have consequences for human wellbeing, social justice and resilience.[3,33] • Not only the interrelationships between different environmental issues themselves but also those between economic, social and/or political aspects of human interdependence on the environment are considered.[11] • Environmental problems require graduates to be able to identify and justify the use of the most appropriate tools and techniques to address the problem.[26] • Implementing responses to environmental challenges requires graduates to have an awareness of the context in which they are responding. For example, simple issues require different approaches to those which require the management of highly complex systems. By having an awareness of the distinction, graduates are able to justify the advice they provide. • Because environmental, social and economic aspects of an issue are interdependent, environmental issues which are complex cannot be resolved using existing problem solving approaches.[6] Therefore, graduates must be able to justify the use transdisciplinary approaches (as opposed to those that are single-, cross-, multi-, or interdisciplinary)[9] for such complex problems. Collaboration towards resolving complex environmental and sustainability issues, therefore, must embrace collective knowledge.[16,20,32] • An understanding of the issue from a systems perspective means that, rather than addressing the symptoms of unsustainability, we can identify the core problems.[2] Understanding the root causes and their interrelationships opens the possibility to more effectively resolve complex issues.[34] This makes management for sustainability solutions driven rather than problem focused.
Skills for Sustainability **3. Demonstrate skills in:**	This TLO aligns with the AQF student attribute related to Skills: that graduates of a bachelor degree will have the: • cognitive skills to review critically, analyse, consolidate and synthesise knowledge • cognitive and technical skills to demonstrate a broad understanding of knowledge with depth in some areas • cognitive and creative skills to exercise critical thinking and • judgement in identifying and solving problems with intellectual independence • communication skills to present a clear, coherent and independent exposition of knowledge and ideas • Because of the multiple interests involved, the resolution of wicked problems is uncertain and a final solution unlikely. This is because any resolution involves social change and brings with it fresh challenges of its own.[23] Problem solving of complex issues focuses rather on problem identification, understanding the root causes of issues,[2] balancing trade-offs and negotiating compromise.[4]
3.1 thinking critically and creatively to envision, design and evaluate alternatives for sustainable futures	• Critical thinking includes the ability to think analytically, to integrate[4,16] and to problem solve.[13,21] However, problem solving for issues of high complexity can be anathema. Constructive problem solving of complex issues focuses rather problem identification and definition, understanding the root causes of issues,[2] balancing trade-offs and negotiating compromise[4] and, ultimately, negotiating pathways towards sustainability.[29] • In order to negotiate multiple-interest solutions to problems a specific type of critical thinking is also required of graduates which gives them an understanding of their own and other's values.[4] Clarifying how values both influence decision-making, broadly and personally, is essential for effective professional and personal decisions.[2,34] • The growing uncertainty of the future means that graduates must also know how to make decisions about policies and measures to prepare society for surprises and unforeseen eventualities.[3,11] Graduates in this field must be especially versed in dealing cautiously with risk, uncertainty and irreversibility[32] often in the face of ill-defined problems[13] and with incomplete information sets and understanding.[14] • Being personally creative and innovative[4] and/or being able to facilitate that in others are considered important in order find novel solutions to current challenges and be able to respond to very different and highly changeable futures.[16,21,34] This will require graduate

	learning approaches such as social learning,[10,35] and participatory inquiry[34] which, if done well, result in collective learning and trans-disciplinary contributions of knowledge to solutions. • It is also important to note that in the field there is a tension between the need for innovation and the value of the traditional e.g. Indigenous land management knowledge for contemporary land managers. • Those working towards improved environmental management and sustainability practices must consider the future. Sustainability encompasses the notion of intergenerational equity which requires graduates to make decisions for the long term.[32] Envisioning a better future[32] requires the ability to reflect, but even more so does forward thinking to foresee the consequences of decisions taken in the present.[10,11] The future must also be strategically considered in order to implement suitable change. Future visioning, scenario building and modelling are just a few examples of learning approaches that enable this. • Critical thinking and evaluation reflect the fact that graduates need higher order thinking skills that encourage deep learning. Deep learning is that which provides holistic insight, an ability to organise and structure disparate types of information into a coherent whole as a result of comprehending the underlying meaning from independent thinking.[19]
3.2 collaborating as a team member and/or leader in learning, analysis, decision-making and action	• There is cross-sector recognition for the need for greater collaboration to attain sustainability.[21,32,36] • Since education for sustainability engages people in developing a shared vision for a range of alternate futures, this will require participatory decision-making to find solutions to complex problems.[10] Collaboration is seen as key to increasing participation and ownership of decision-making.[32] Not only is this likely to result in more informed stakeholders[32] but also better decisions.[2] For such collaboration to occur, graduates will need high level interpersonal skills[13] which allow them to respond appropriately in complex more than disciplinary and inter-cultural situations.[2,14,20] • Collaborative decision-making and effective actions will require graduates to have the ability to listen.[14] This is especially true in light of the evidence which highlights the importance of collaboration and dialogue[2] - an important skill which encourages the ability to collectively solve complex problems. • Having the ability to explore the tensions among conflicting aims[2,13] is a critical skill for participatory decision making. Therefore, the ability to negotiate and facilitate are seen as important communication skills.[2] • Reflective thinking is also required if students are to understand the beliefs and values that underlie the attitudes of people to the environment, that influence decision making and that drive their own worldview.[10] • The facilitation of social learning[37] would also require graduates to be able to support the building of networks and relationships among stakeholders.[17]
3.3 communicating to diverse audiences in varied contexts.	• Communication of advice on environmental decisions is a critical skill.[26] The underlying aims of communication are to motivate and inspire hope towards a more sustainable future.[11] • This may involve converting complex environmental information to a form which is more accessible. Because of the transdisciplinary nature of the field, the ability to communicate and understand the significance of their work to a range of different professional, cultural, social and political contexts is especially important.[10] Choosing the communication tool for specific audiences is an important consideration ranging from the more traditional (e.g. written and oral) to the creative use of newer digital formats.[26] • The following distinct forms of writing skills are considered especially important for professional work in environment and sustainability: writing a report (e.g. as a consultant for a client or as an employee for an organisation), writing an essay, writing a technical report (e.g. scientific or economic), writing an academic paper and writing a literature review (whether or not in an academic format). • Deeper understanding which results from students' higher order thinking skills is a precursor to communications skills. Graduates need to be able to communicate the concepts and principles of sustainability and environmental values with sufficient conviction to gain broader acceptance of pathways to a more sustainable future i.e. as a critical part of the change process.[32] It is critical to have a depth of understanding to enable society to transition to a more sustainable future.[36]

Professional, Civic and Personal Responsibility **4. Demonstrate capacity for professional, civic and personal conduct**:	This TLO aligns with the AQF student attribute related to Application of Knowledge and Skills: • with initiative and judgement in planning, problem solving and decision-making in professional practice and/or scholarship. • to adapt knowledge and skills in diverse contexts. • with responsibility and accountability for own learning and professional practice and in collaboration with others within broad parameters.
4.1 as a facilitator of learning and transformation	• Transformational change is not optional but a necessity and an understanding of the urgent need for change is critical.[11] These changes include transformation[34] institutions and governance, our economic system and our individual and collective day to day actions.[2] It also includes the transformation of our own mental models.[4] • What may differentiate Environment and Sustainability as a field from other disciplines is the expectation that graduates have the capacity to be socially and environmentally active and responsible.[16] Graduates must have the skills that allow them to both model appropriate behaviour themselves and to support this in others.[13] Since the critical factor for better managed environments is an actual change in how we act[2] having sufficient knowledge and correct intentions is, by definition, insufficient. • The capacity to act as a change agent includes the willingness and the know how to take considered action even in situations of uncertainty.[11] It also requires graduates to think outside the societal norm requiring them to question what they see ordinarily as standard practice.[4] • A change agent might include the ability to: lead initiatives for change; influencing, persuading or challenging others professionals to promote sustainability; the ability to share knowledge and advice with others; the ability to lead improvement in environmental awareness within the workplace and to effect changes in workplace culture.[26] Facilitating change is as much about empowering others to be the source of change as it is the capacity of bringing about personal change e.g. having attributes such as the capability to make strategic alliances.
4.2 in decision-making and action grounded in an ethos of sustainability	• In a very general sense, graduates are expected to apply their knowledge and understanding in a manner that indicates a professional approach to their work or vocation. Such a professional approach includes understanding their professional responsibilities,[13] being capable of professional judgement and initiative,[16] having professional skills. • Graduates are expected to act ethically on a day to day basis[14] so that they are engaged and ethical local and global citizens.[16] If sustainability is to be achieved, then graduates must themselves be able to demonstrate the capacity for appropriate behaviour both in their private and professional lives.[10] With this comes personal responsibility and cultural maturity[21] and an accountability for their action.[10] • Graduates will also be able to demonstrate attitudes and values fitting to particular situations[10,14] and this further requires the capacity to make decisions about what is appropriate in context. This is especially true for progress towards a more sustainable future which cannot ignore aspects of fairness and social justice.[10] Graduates are expected to be motivated to make a positive contribution to other people and their social and natural environment, locally and globally.[11] • Graduates are expected to derive their own personal, evidence based sustainability ethos on the basis of independent reflection and critical thinking.[3] • Graduates will understand basic principles of environmental ethics which can be informed by accepted practice.[26] This includes the capability to reflect upon current practices and norms and formulate ethical and moral responses. Deep understanding resulting from higher order thinking skills is critical if students are also to recognise the models of environmental ethics that drive decision-making[10] and be able to offer alternate governance and institutional options required for improved environmental management.[2] • Graduates need to understand their personal world view and cultural assumptions that are embodied within this worldview just as they are expected to strive to understand those of others.[11] • Learning and teaching in Environment and Sustainability may also involve encouragement of ethical practice which emphasizes the rights and relationships between people and nature and is distinct from that which predominates in other disciplines that focus on relationships about and between people.[10]

4.3 through continuing reflection, and ethical and intellectual development.	• Active participatory learning encourages self-management[18] which is especially critical at this time where life-long learning[38] is assumed for most professionals and individuals in a world which is changing at an increasing rate. Graduates from all disciplines require ongoing learning to improve job security, career development, career re-development and career advancement;[39] this is especially so for environmental and sustainability graduates, since it is a field of evolving expertise and shifting priorities and practitioners must continually update their skills to ensure that they are current.[16,21,34] Developing skills in self-management which support motivation towards ongoing learning will be important. • In order to allow on-going life-long learning graduates will need to know where to look for support and information[26] and strategically plan for addressing personal knowledge and skills gaps.[26] • Planning for greater self-understanding and self-improvement will be critical if graduates are able to communicate their own ethics and values.[26] To facilitate this reflection, graduates must be able to evaluate their own work using structured processes. It is important to note that students are not expected to take on particular values (e.g. such as those espoused or imposed by the lecturer) but are expected to develop their own individual values. Ongoing learning will also require graduates to be able to reflect on new evidence and revise judgement and actions appropriately. • By understanding the value of self-reflection, graduates can better see the value of such a process for others involved in participatory decision-making[34] and ensure that these opportunities are supported when collaborating with others. Graduates will also need to understand that others will act authentically in line with their own personal values and moral compass.

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