



A learning design framework for community resilience: International and transdisciplinary perspectives on a boundary object

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ABSTRACT

To equip graduates to respond to sustainability challenges, higher education institutions are developing programs and innovative pedagogical approaches that target new types of 21st century knowledge and skills. Resilience is a core concept in sustainability discourse, and one that is also driving pedagogical innovation that targets specific learner attributes. We argue that the topic of community resilience – as a theoretical boundary object – presents rich opportunities for transdisciplinary Education for Sustainable Development (ESD). This paper highlights international and cross-disciplinary trends in learning design for community resilience-focused university programs. The results outline the survey responses of 111 educators, researchers, and practitioners from a range of disciplines. One-way analysis of variance showed consistent results across the different groups of participants, regardless of geographic location, disciplinary background, or employment context. The research offers a learning design framework for teaching community resilience in higher education institutions, highlighting the importance of academic–practitioner collaboration in program development, disciplinary expertise to inform transdisciplinary learning, hybridised pedagogical approaches, and fostering student agency through assessment tasks.

Introduction: community resilience in education

In response to the growing complexity of interconnected environmental, social, cultural and economic problems facing the world, higher education institutions (HEIs) are moving towards integrated and transdisciplinary approaches to learning and teaching that target sustainability issues (Radinger-Peer & Pflitsch, 2017). Current and future graduates will be required to understand and address complex global challenges and respond to fundamental issues such as those framed by the United Nations Sustainable Development Goals as part of the current “Decade of Action” (UNSDG, n.d.).

A central theme in sustainability discourse is *community resilience*: how communities respond and adapt after a shock or change. The idea of community resilience stems from the broader concept of *resilience*, while calling for localised, context-specific understandings of resilience, highlighting the social dimensions of sustainable development. Norris et al. (2008) define community resilience as “a process linking a network of adaptive capacities (resources with dynamic attributes) to adaptation

after a disturbance or adversity” (p. 127). Yet, given the systemic scale and integrated nature of indicators for community resilience, the term is highly contested across disciplines, as well as in critical disaster theory (Dahlberg, 2015). This presents challenges when developing transdisciplinary programs that address a necessarily holistic view of community resilience from social, economic, political, and environmental perspectives. Responding to this problem, this research seeks to illuminate approaches to teaching and learning that are best suited to the subject of community resilience through a transdisciplinary lens. In this way, future graduates can be equipped to approach sustainability issues as place-based, integrated, and conceived at multiple scales.

As a theoretical boundary object, the concept of community resilience has many interpretations. However, there are a series of common elements evident in the literature, including: community networks and relationships, governance and leadership, and resources (Patel et al., 2017). Norris et al. (2008) consider that the concept of resilience emerges from a set of adaptive capacities, where community resilience implies networked adaptive capacities expanding out from the

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individual to communities and systemic frames. Patel et al. (2017) outline nine core elements commonly seen in definitions and descriptions for community resilience: (1) local knowledge, (2) community networks and relationships, (3) communication, (4) health, (5) governance and leadership, (6) resources, (7) economic investment, (8) preparedness, and (9) mental outlook (Patel et al., 2017). It is this combined framing of the concept of community resilience as both systemic in scale and integrated in nature that has informed the transdisciplinary approach to this research project.

Both the observable terminological ambiguity and the conflicting understandings of community resilience seen in the literature extend into teaching and learning in educational contexts. Higher education courses on community resilience rarely share a common language or theoretical perspective; instead, they reflect varied professional identities and disciplinary approaches. Recognising that education should reflect the complexity of the outside world (Organisation for Economic Co-operation and Development (OECD), 2018), HEIs are moving towards integrated, transdisciplinary, experiential, and scenario-based learning, and are attempting to bring the “outside world” into the classroom (Evans et al., 2015). In addition to the known pedagogical benefits of experiential learning, such as student engagement and retention (Nygaard et al., 2013), there is also industry demand for graduates with both broader perspectives and real-world expertise, the latter of which is engendered through the development of contextually rich learning experiences in academic programs (Webster, 2006). But the challenge for HEIs lies in developing effective and impactful skills within structured educational programs, pointing to the need for informed approaches to learning design for teaching about community resilience.

This study thus examines international, multidisciplinary perspectives on community resilience education in order to define the core components of effective programs across disciplines and geographical contexts and identify potential opportunities for learning design in community resilience education.

Literature review

This literature review examines the importance of resilience, and community resilience education to support sustainability transitions at local, regional and global scales. Previous research has shown that there is a lack of consensus about or shared definition for the concept of resilience, making a common starting point for educational offerings difficult to articulate. However, language commonly associated with the framing of resilience does have recurring themes that underpin understanding—for example, *adaptability*, the ability to absorb or bounce back from shock. The concept of resilience can therefore be understood as a theoretical “boundary object” that crosses geographic and disciplinary domains while remaining both ill-defined and contested in scholarly literature (Patel et al., 2017).

Community resilience as a theoretical boundary object

Resilience is often referred to as “boundary object” by disaster scholars (Baggio et al. 2015, Brand & Jax, 2007, Meerow et al. 2016, Rega & Bonifazi, 2020). Also considered a “bridging concept” that is malleable and able to be used in so many different fields and contexts (Baggio, et al., 2015, p. 1). Leigh Star (2010) describe boundary objects, not as concepts that sit at the edge, or periphery, but as flexibly interpreted “shared space” (pp. 602-603).

Definitions for community resilience tend to focus on access to and availability of community resources in environments that are “characterised by change, uncertainty, and surprise” (Magis, 2010, p. 401). The concept of community resilience connects social-ecological systems that are ubiquitous within resilience theory, psychology, and mental health (Berkes & Ross, 2013). *The conceptual* overlay of environmental disaster risk with people-place connections illuminates fertile ground for

transdisciplinary explorations of resilience. Increasingly, the physical and social impact of climate change and associated shocks (e.g., floods, storms, and drought) have been set centre stage in very localised contexts. This situation highlights the need to better understand the term community resilience in order to inform its meaningful education design and delivery. Additionally, how we contextualise education is becoming increasingly prominent, particularly across curricula that attempt to address multi-agent systems while maintaining a strong community focus.

Transdisciplinary approaches to learning about community resilience

As societal challenges become more complex, problem identification, solution ideation, and even research boundaries are becoming more collaborative. The understanding of disciplinarity has progressed substantially from the times of unidirectional considerations of knowledge, skills, and issues. Increasingly, education and practice are moving from intradisciplinary approaches to various forms of multi-, cross-, and interdisciplinary coproduction of new knowledge.

For the purpose of this research, *transdisciplinary* is understood to mean the creation of unified intellectual frameworks that transcend any one disciplinary perspective (Jensenius, 2012). A multidisciplinary approach requires that people from distinct disciplinary backgrounds working together; and an interdisciplinary approach requires the integration of the thinking and knowledge of different disciplines (Jensenius, 2021).

While both multi- and cross-disciplinary approaches place disciplinary insights side-by-side, the interdisciplinary approach is more interactive. However, transdisciplinary approaches to thinking and knowledge production can be transformative, since these take into account the expertise and lived realities of stakeholders beyond the “blue-sky” thinking of academics. In this paper, we attempt to establish what is required for a transdisciplinary approach to community resilience education with the ultimate hope of providing scaffolding for HEIs to produce practitioners from any discipline who will be equipped to lead and collaborate in community resilience processes via transformative transdisciplinary strategies.

Higher education graduates are confronted with complex socio-technical, socioeconomic, and sociopolitical situations that require an array of skills beyond the traditional and professional competencies established in specific programmes. The core knowledge traditionally developed in disciplinary educational structures is often decoupled from the complexities of real-world situations that are faced in practice. It is thus important for HEIs to equip learners with emerging inter-, multi-, and transdisciplinary thinking that goes beyond traditional siloed approaches. This is especially true now that the world is confronting large-scale crises with local impacts, such as climate change and the COVID-19 pandemic.

It is recognised that “soft skills” such as critical and creative thinking and effective communication will be essential for the professional workplace of the 21st century (Straková & Cimermanová, 2018). These priorities are interconnected with ideas such as “climate literacy”, but even the most progressive institutions tend to “add-on” climate change to undergraduate level studies. Practically, this has resulted in post-graduate competency-based “chartership training” that mirrors the changing areas of professional practice in the industry and backfills missing learning from practitioners’ previous higher education programs. Interconnected issues of climate change, disaster risk, and community resilience are increasingly seen as an integral component of pedagogy across learning areas and beyond higher education.

Systems-scale thinking and sectoral siloes

Complex sustainability problems cross disciplinary boundaries and also systemic, or sectoral, domains. Sustainable development is frequently framed according to three ‘pillars’, or overlapping circles,

which encompass economic, social and environmental factors. This frame is ubiquitous in sustainability discourse, yet the conceptualisation of the theoretical basis of those three domains has not been established; a gap that Purvis et al. (2019) attribute to having arisen “from broadly different schools of thought historically” (p 681).

It is widely acknowledged that, when considering sustainability issues – such as community resilience – the systems-scale complexity inherent in problems we face require *both* trans- interdisciplinary perspectives *and* systems-scale thinking that transcends geographical and sectoral boundaries (Brogden, 2019; Elmquist et al., 2019, Martin et al., 2005; Nguyen et al., 2012). When applied to education, it is in this way that ESD helps to foster one of its core goals, which is global citizenship (OECD & PISA, 2018).

Case studies and scenario-based learning is a popular pedagogical approach for systems thinking in learning design, but delivery of these forms of teaching in ESD can also present challenges for “career academics” (Eilam and Trop, 2010). Tennant et al. (2015) define a career academic as “a research-active university staff member with very limited professional or practical experience of working in the industry in which they are a scholar” (p. 729). An academic with industry experience prior to entering academia may be better positioned to support contextualised learning of this nature—both through their lived experience and their professional networks. However, some HEIs prefer to hire career academics, who are seen to have greater research outcome potential (Forster et al., 2017; Pilcher et al., 2021; Tennant et al., 2015) than candidates with practical industry knowledge and experience. When considering approaches to community resilience education, the inclusion of academics with such experience would therefore be of benefit.

Research methods

This paper presents findings from research that explores curricula, pedagogical approaches, and theory about community resilience in higher education. The study aimed to capture a cross-disciplinary stakeholder view in order to explore how education that targets community resilience is currently understood and delivered. While similar papers have explored these issues across specific geographies, our international focus provides a broader and more widely applicable understanding of the current essence of community resilience education.

This study is part of a larger research project funded by the Royal Academy of Engineering’s “Frontiers of Development” program, and forms one of three main contributions to community resilience in education research. Specifically, it focuses on pedagogical approaches, complementing parallel investigations into curriculum design, and an interdisciplinary review of community resilience literature (forthcoming).

An international research team was formed between six HEIs and one architectural practice at the *Urban Opportunity for Building a Resilient Future* symposium in Kuala Lumpur in July 2019. Team members’ backgrounds include engineering, architecture, urban planning, and design. This paper supports both of the projects’ overall project objectives, which are: (a) to understand the complexities of community resilience as a boundary object, and (b) to build an online open educational resource or use by educators seeking to address issues of community resilience through teaching and learning. Using the research methods outlined in this section, we aimed to illuminate a trans-disciplinary perspective on relevant approaches to community resilience education by addressing the following main research question:

To what extent do conceptual boundary conditions such as disciplinary background, profession/vocation or geographical location influence views on teaching and learning for community resilience?

Then, we sought to gain an understanding of the following, with a contextualised interpretation of each participant view:

What graduate capabilities are most important in community resilience education?

What pedagogical approaches are best suited to community resilience education?

What are the preferred modes of assessment?

What disciplines are most relevant to community resilience?

In order to explore opportunities for learning design in community resilience education, this study adopted a quantitative approach to describing and better understanding the perspectives of international respondents from a variety of disciplinary backgrounds. An online survey captured the views of respondents to explore common approaches to the development and design of community resilience programs. Online surveys are well understood as a low cost, accessible, time efficient, and flexible research method that can reach a large scope of potential respondents, thus enabling “access to data that range in focus from peoples’ views, experiences, or material practices, through to representational or meaning-making practices” (Braun et al., 2020, p. 2). Google Forms was used to create and distribute the online survey. Participation was voluntary and the survey was designed to ensure the anonymity of respondents. Ethical clearance for human research was sought from the Heriot-Watt University Research Ethics Committee.

Data collection

The online survey was promoted by all members of the research team through social media (Twitter, Facebook, and LinkedIn). The survey link was also distributed via email throughout the authors’ professional networks, as well as to all participants of the Royal Academy of Engineering symposium (2019). In total, 111 respondents completed the online survey in October 2020. While the convenience sampling approach used is unlikely to be representative of the general population and therefore limits the generalisability of findings, it did enable the research to capture valuable insights about what education stakeholders prioritise through the development and design of an innovative and contextual university educational offering in community resilience.

The survey was divided into sections, with questions seeking information about participants’ professional or vocational context, discipline or field, involvement in resilience education, and geographic location. Participants provided opinions on learning design for community resilience education, via a series of Likert-scale and multiple-choice options. Questions were developed collaboratively by the research team and drawn from our collective experience developing and implementing higher education programs within our respective disciplinary areas. These included:

What delivery modes are preferred (whether in-person, blended, or fully online)?

What graduate capabilities / learning outcomes should be prioritised?

What are the preferred methods of assessment that best suit community resilience learning?

For transdisciplinary programs about community resilience, what disciplines are best incorporated?

Statistical analysis

Two statistical analysis methods were applied to the data sets using the Statistical Package for Social Sciences (SPSS) v.27 software. The first method used was one-way analysis of variance (one-way ANOVA), which identified whether there were significant differences in responses between different groups of participants. One-way ANOVA assumes that each sample is an independent, random sample and that the response variable follows a normal distribution (i.e., variance is homogeneous; Field, 2009). The first assumption was met, as comparisons were made between independent groups of participants, while the homogeneity of variances assumption was tested using Levene’s test, with a confidence interval set to 95%. Homogeneity of variance was met for most cases; for the very few cases where it was not met, one-way Welch’s ANOVA results were used, as these are not sensitive to unequal variances (Field,

2009).

The second method used was Pearson’s correlation analysis, which is useful for determining the strength and direction of the association between two scales or ordinal variables. More specifically, Pearson’s correlation coefficient is a measure of linear association, and is a test commonly used for parametric analysis (where data follow a specific structure or distribution such as normality; Field, 2009). Positive correlations indicate that if one variable increases, the other variable also increases. Negative correlations indicate that if one variable increases, the other variable decreases.

For both one-way ANOVA and Pearson’s correlations, results were considered statistically significant for $p < 0.05$ and $p < 0.01$, where p is the significance value. Furthermore, effect sizes were computed by using eta squared (η^2) for one-way ANOVA results that were found to be statistically significant. Such effects can be categorised as small (0.2), medium (0.5), or large (0.8), using Cohen’s scale (Cohen, 1988). It is important to note that small effect sizes indicate that differences observed are trivial, even if they are statistically significant. Therefore, it is critical to report effect sizes (η^2) in addition to significance values (p) for one-way ANOVA results.

Results

The presentation of results reflects three sections of the survey. First, we outline information about the survey participants, giving an understanding of the demographics of the stakeholders engaged in community resilience education. Second, we outline what graduate capabilities are seen to be most important in community resilience education. Third, we describe participants’ preferred pedagogical approaches. Finally, we establish to what extent survey responses either differed or aligned according to participants’ disciplinary backgrounds or geographic locations.

Educators—who is teaching community resilience?

The majority of survey respondents were in the “educator/academic” category (63.9%; see Fig. 1). In regard to these demographics, in retrospect, the “researcher” category (15.7%) could be considered a subset of the academic category; as such, practically speaking, 79.6% of participants were likely educators or academics. The “practitioner/professional” category amounted to only 15.7%. In terms of their professional and vocational contexts (see Fig. 2), the majority of respondents (81.6%) worked in either urban planning (30.6%), social sciences (18.5%), environmental science (9.3%), architecture (9.3%), engineering (7.4%), or construction/surveying (6.5%).

One-way ANOVA results showed that neither participants’ employment context nor disciplinary area significantly affected the answers provided in any of the other questions ($p > 0.05$), results being therefore statistically consistent among different employment and disciplinary contexts. One-way ANOVA results also showed that the field of employment/discipline did not significantly affect the answers provided in all but one question, $F(6,101) = 2.234, p = 0.046, \eta^2 = 0.117$, the exception ($p > 0.05$) being the “research skills” question (see section 4.2). In practice, this means that most of the results were statistically consistent across the different employment contexts and disciplinary backgrounds. Differences between fields of employment/discipline for the “research skills” question are discussed in section 4.2.

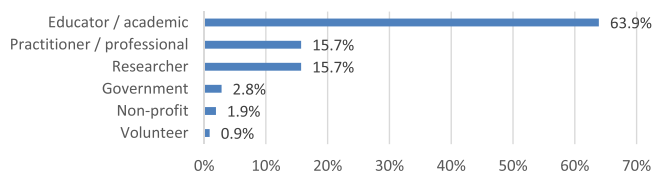


Fig. 1. Professional and vocational employment context of participants.

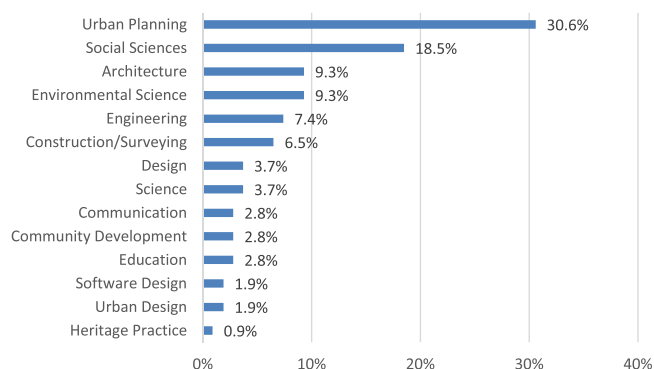


Fig. 2. Current disciplinary area of participants.

Only 7.4% of respondents were delivering an education offering that focussed specifically on resilience, and a significant proportion of the participants (43.5%) stated that they were not involved in resilience education at all. Some suggested that they were offering resilience education, but as a subset of an existing course/module (23.1%). The remainder of respondents had previously or were currently participating in training, workshops, or education in resilience (25.9%). One-way ANOVA results showed that not being involved in resilience education, or being only somewhat involved, did not significantly affect answers; that is, results were statistically consistent, regardless of whether or not participants were involved in resilience education. This is particularly important, as it indicates that the inclusion of participants who were not involved in resilience education is not a limitation of the current study, which we expand upon further in section 6.1 – Bridging the academic/practitioner divide (p. 20).

The majority of participants (91.7%) came from either: Nigeria (49.1%), the United Kingdom (15.7%), South Africa (11.1%), New Zealand (7.4%), the United States of America (5.6%), or Australia (2.8%). One-way ANOVA results showed that participants’ country did not significantly affect the answers provided in all but one question, $F(6,101) = 2.530, p = 0.025, \eta^2 = 0.131$, the exception ($p > 0.05$) being the question about “professional roles” (see section 4.2). In practice, this means that results were statistically consistent between the different countries for all but one test.

Graduate capabilities—what outcomes are expected in community resilience education?

The second section of the survey focussed on graduate capabilities fostered by community resilience education. Five-point rating Likert-scales were used in this section of the survey to evaluate attributes, where 1 corresponded to “not important” and 5 to “very important”. With respect to graduate capabilities, a “high” or “very high” importance (values 4 or 5 in the five-point scale) was attached to the following graduate capabilities: the “ability to analyse complex scenario-based problems”, “understanding professional roles” (and how they work together in practice), “the ability to work in groups”, “presentation skills”, “critical thinking”, and “research skills”.

All of the expected course outcomes presented by the survey were ranked as either “important” or “very important” by at least two-thirds of the respondents, suggesting that all the outcomes mentioned should be considered for resilience education (see Table 1). In particular, “critical thinking skills” were clearly identified as the most important graduate capability (95.4%). Furthermore, statistically significant correlations ($p < 0.05$) were found between the importance ratings of expected course outcomes, but the strength of correlations was low (i.e., Pearson’s correlation coefficient $r < 0.4$). “Understanding professional roles”, in particular, showed highly significant correlations with 4 out of 5 of the other outcomes, suggesting that an understanding of professional roles was expected to affect most other course outcomes.

Table 1
Graduate capabilities / expected learning outcomes (“important” and “very important” percentage results).

Graduate capabilities / expected learning outcomes	Important	Very important	Total
Ability to analyse complex scenario-based problems	24.1%	63.9%	88%
Understanding of professional roles	38%	39.8%	77.8%
Ability to work in groups	30.6%	62%	92.6%
Presentation skills	38.9%	31.5%	70.4%
Critical thinking skills	18.5%	76.9%	95.4%
Research skills	37%	45.4%	82.4%

One-way ANOVA results showed that the field/discipline of respondents did affect answers to the question, “How important are research skills in community resilience education?”, $F(6,101) = 2.234, p = 0.046, \eta^2 = 0.117$. In particular, participants working in engineering rated “research skills” lower than any other group (3.5/5). In comparison, ratings were in the 4–5 range for participants working in urban planning (4.4/5), social sciences (4.0/5), environmental science (4.4/5), architecture (4.2/5), construction/surveying (4.7/5), and all other fields/disciplines (4.4/5). It can be noted that a rating of 4 corresponds to “important”, while 5 corresponds to “very important”; such differences, although statistically significant, have little practical implication, as is also demonstrated by the small effect size (η^2).

One-way ANOVA results also showed that the country where participants were based significantly affected views on the importance of “understanding professional roles”, $F(6,101) = 2.530, p = 0.025, \eta^2 = 0.131$. Participants’ ratings were: Nigeria 4.4/5, United Kingdom 4.2/5, South Africa 3.8/5, New Zealand 3.6/5, United States of America 3.7/5, Australia 3.3/5, and any other country 4.2/5. Australia’s rating was the lowest, but it should be noted that only 3 participants from Australia answered the survey—that is, the difference observed is not in fact statistically relevant. All other ratings were close to 4 or 5 (when rounding), suggesting that such differences have little practical implication, as is also demonstrated by the small effect size (η^2).

Pedagogy—how is community resilience being taught?

The third section of the survey focussed on capturing perspectives of how community resilience is currently being taught. Fig. 3 indicates that blended learning was clearly the preferred mode of education (83%), with an expectation that students could study remotely, provided they also had on-ground (face-to-face) activities. “Fully online modes” was

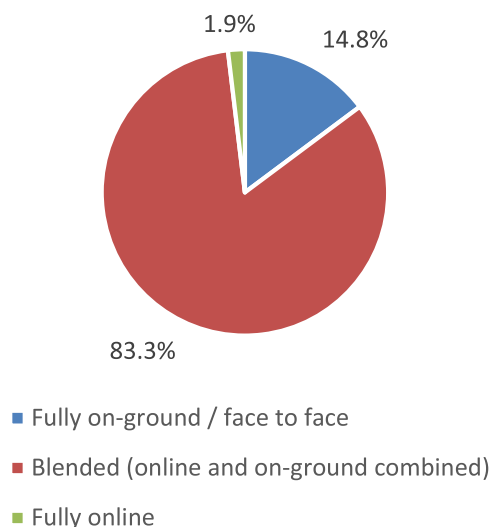


Fig. 3. Preferred modes of resilience education.

favoured by only 2% of the respondents, whilst the “fully on-ground/face-to-face mode” was preferred by only 14.8% of participants. This highlights the importance of including face-to-face education options, and also perceived advantages associated with online learning.

When asked about preferred methods of teaching, or approaches to pedagogy, participants favoured “action learning/learning by doing/live projects” (73%), “group work” (66%), “case studies” (59%), and “lectures” (51%). The least favoured methods (with more than one response) were “secondment”, “flipped classroom”, and “self-directed learning” (see Fig. 4).

In terms of assessment (see Fig. 5), participants identified “presentations” (62%), “discussion forums” (57%), and “individual reports” (56%), as preferred options. Traditional methods of assessment such as “tests” (31%), “quizzes” (19%), and “interview/oral exam” (31%) were less preferred.

This section should be moved to the top with disciplinary background.

Finally, when asked what disciplines should be included within transdisciplinary community resilience education (see Fig. 6), over 50% of participants agreed that the following disciplines should be included: environmental sciences (80.6%), urban planning (73.1%), social sciences (67.6%), communication (59.3%), urban studies (56.5%), health and wellness (54.6%), engineering (53.7%), architecture (53.7%), and design (50%).

Discussion

Through our investigation of three main drivers informing community resilience education—educator background, graduate attributes, and pedagogical approaches—a number of significant and interrelated areas of interest emerged. These are outlined in this discussion as a learning design framework with four main observations: (1) bridging the academic/practitioner divide, (2) disciplinary expertise to inform transdisciplinary learning, (3) hybridised pedagogical approaches; and, (4) assessment and student agency. Each theme is discussed in the following sections in more detail, with specific focus on the current and emerging characteristics of learning design for community resilience education.

Bridging the academic/practitioner divide

The majority of respondents described themselves as “educators/academics”, with an additional group characterising themselves as “researchers”. As previously noted, this group can ostensibly be considered a subset of academic practitioners. The combined total (79.6%) represents a significant participant group, which incorporates participants across traditional roles in teaching, research, and scholarship, as well as independent researchers affiliated with HEIs. It is important to note that 43.5% of respondents indicated that they were not involved in resilience education, but they nonetheless indicated similar preferences for teaching and learning approaches for community resilience education. This is significant because, regardless of formal involvement in

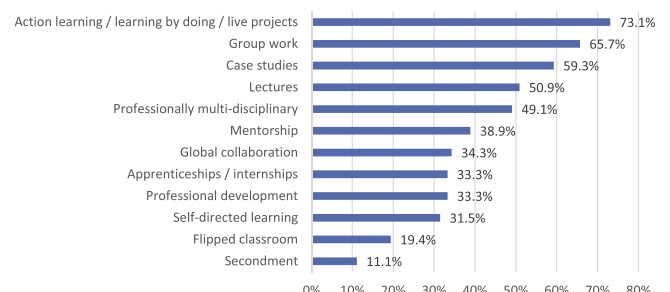


Fig. 4. Preferred methods of resilience education.

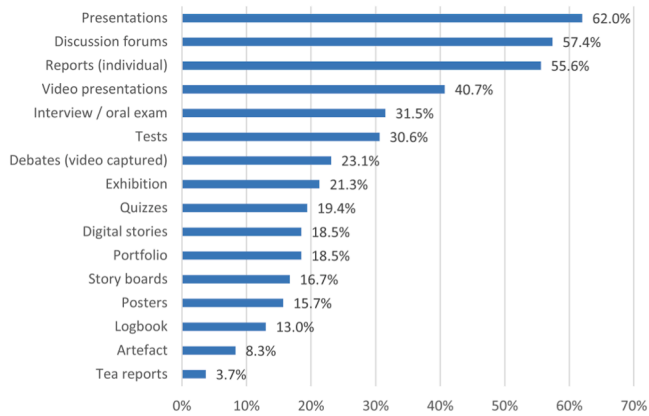


Fig. 5. Preferred methods of assessment.

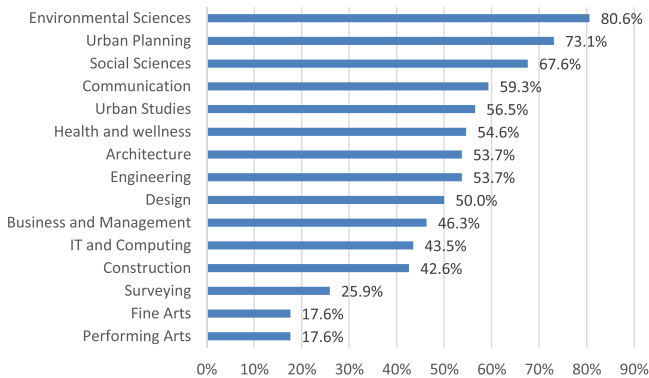


Fig. 6. Disciplines that should be taught in a community resilience curriculum.

education, those involved in community resilience areas are equally inclined to recognise value in flexible approaches to teaching and learning. Thus reinforcing the transferability of knowledge and skills types between practice and education and potential for academic-practitioner collaboration in program development.

The second largest category (15.7%) of respondents characterised themselves as a “practitioner/professional”. Overt calls have been made for “greater collaborative relations between academia-industry in aiding student learning experience and subsequent transition to graduate employment” (Forster et al., 2017, p. 80). Certainly, the goals and methods of the survey uphold the importance of integrating views from both categories when designing pedagogical approaches in recognition of the role and value of industry practitioners and the importance of bridging academia and industry practice through education.

While this study did not interrogate the degree to which practitioners have interacted with academic institutions, or their exposure to curriculum design, the value of industry-based perspectives within higher education is widely acknowledged. This is also evident in the hiring of educators who have previous or ongoing experience in practice, such as the frequent employment of architecture practitioners as adjunct professors (Pilcher et al., 2017), and in the skills of the casual HEI workforce, which is made up of postgraduate researchers and industry professionals. As such, the experience within university teaching teams can also be multifaceted and transdisciplinary, drawing upon the experiences of both full-time academic educators and industry practitioners.

When considered in the context of resilience education, understanding, negotiating, and capitalising on the academic/practitioner divide would appear to contribute to a stronger pedagogical positioning that potentially informs teaching and learning activities. As discussed earlier, resilience, and in particular, community resilience, draws on

many disciplinary perspectives. The inclusion of academic and practitioner perspectives in an educational setting can thus provide students with the kind of real-world expertise and experience desired for professional life.

The multidisciplinary nature of teams that are engaged on complex community resilience projects calls for an accurate understanding of professional roles. The formation of both professional identity and student acculturation in higher education is core to the student learning experience and is especially important for vocational and professionally accredited degree programmes. This is indicated where participants ranked the importance of “understanding professional roles”, with significant correlations with 4 out of 5 of the other graduate capabilities / expected learning outcomes listed (see Table 1). Survey participants evidently had an understanding that a grasp of professional roles was expected to affect most other courses outcomes. Professional roles are ostensibly competency-based and are linked to learning outcomes via the attainment of subject mastery; evaluation of such outcomes is a critical component of higher education models. It is also essential that students understand professional roles within collaborative teams, and are able to situate their own disciplinary knowledge within a systems-scale mode of thinking.

Disciplinary expertise to inform transdisciplinary learning

Survey respondents came from a variety of disciplinary backgrounds, revealing a wide range of expert viewpoints as well as perspectives from participants with minimal understanding of/experience in community resilience. Importantly, the findings indicate that the disciplinary background of respondents did not significantly alter responses, reinforcing the likelihood that community resilience is a true boundary object for negotiating transdisciplinary learning and practice. This contributes to the argument for an educational offering that crosses disciplinary boundaries and reflects the complexity of real-world practice. Furthermore, findings also suggest that geographic location did not significantly impact responses, indicating that topics of community resilience may offer opportunities for common ground and alignment across both transdisciplinary and geographic boundaries.

When asked about the disciplines that should be included within a community resilience education offering, respondents frequently considered disciplines beyond their own. The top five disciplinary perspectives identified as important were: (1) environmental sciences, (2) urban planning, (3) social sciences, (4) communication, and (5) urban studies. When compared to the top five fields/disciplines self-identified by respondents, only three of these were included: (1) urban planning, (2) social sciences, and (3) environmental sciences, with architecture and engineering being excluded. Of note is the prominence of *health and wellness* (at 54.6%), which ranked sixth in disciplinary importance, and the significance of this ranking given that none of the respondents identified themselves as being currently active within health and wellness disciplines. Furthermore, communication also received the fourth highest ranking, even though less than 3% of respondents worked in that field.

Another area of emerging interest linked to transdisciplinarity is the notion of core and transferable skills. Fry et al. (2008, p. 123) discuss “skills” development in learners, indicating that while skills have varied terminologies in different cultural contexts, “universal acceptance” is generally noted in the following areas: communication skills, information management skills, modern information and IT skills, people skills (team/group work), and personal skills. Industry emphasis on these skills is clear in the increasing calls of employers for graduates who can “hit the ground running” (Fry, 2008, p. 122). More recently, consideration of similar transdisciplinary core skills has become an important part of HEI development, with many institutions embedding core competencies or graduate qualities, which recognises the need for students to develop common transdisciplinary skills, knowledge, and values.

Hybridised pedagogical approaches in community resilience education

Respondents identified “action learning”, “learning by doing”, and “live projects” as their preferred methods for teaching about community resilience, closely followed by “group work”. This suggests that both collaborative, and experiential learning approaches could have a critical role to play in community resilience-focused educational offerings; indeed, the findings generally reflect a conceptual move away from classical and traditional methods of education delivery.

Innovation in education is driven by technological advances, which can contribute to areas of significant educational disruption, such as “online course offerings” (Barber et al., 2013, p. 18). In addition, while online education can reasonably be expected to successfully deliver theory-based concepts, the onus is on the student to take more individual control of their study patterns and progress. The team-oriented, experiential models of learning identified by respondents as critical to resilience education can be challenging to replicate in an online context. Furthermore, participants’ responses suggest that “self-directed learning” and “flipped classroom” modes (where students learn in a self-directed way initially before coming together in a group setting such as a seminar) were not favourable approaches for delivering resilience education, a result that resonates with the need to focus on creating spaces that facilitate experiential learning.

The preferred mode of resilience education identified by respondents was “blended”, with a very high percentage of 83%. This mode of learning is a combination of online and on-ground (face-to-face) engagement. Blended learning, and, more recently, responsive blended learning, is characterised as an approach that “combines active, supported online learning and face-to-face support in a way that is pedagogically appropriate and practically deliverable, responding dynamically to particular local contexts” (Heriot-Watt University Learning + Teaching Academy 2020, p. 1). Participants’ preference for blended learning reflects a wider educational sector shift in delivery modes that aims to (a) offer responsive education that suits a wide range of theoretical perspectives and knowledge types (Cronjé, 2021); (b) provide the recognition and retainment of critical socialisation components (Barber et al., 2013); and (c) uphold the importance of regular, real-time feedback (Hepburn et al., 2021). Blended learning also offers benefits for HEIs, including a shift away from the rigid lecture theatre or studio space norms of time, place, and physical room capacity. Instead, it creates more flexible models of delivery through distributed learning sites. Since this mode also potentially reduces students’ travel to campus, blended learning can minimise the environmental impact of education, which seems appropriate for resilience education.

Reflecting on the notion of “action learning” preferred by the respondents, student socialisation is a well-established feature of traditional university student life and is still highly valued in a learning setting (Barber et al., 2013). Within an academic context, Fry et al. (2008) indicate that learners “should be able to work with and meet obligations to others” (p. 131), and this is especially true in an experiential learning environment. Interactions that are supported and enacted in action learning can encourage socialisation, and, in terms of complex problem solving, interaction can contribute towards increased innovation and novel solutions.

Student agency and assessment tasks

Finally, it is also important to consider the activation of student agency through community resilience education. Agency refers to individuals and groups being able to find meaning and to practice with intent (Garraway & Morkel, 2015); in the context of this research, agency is considered through potential methods of assessing resilience education. Respondents identified that “presentations” (62%), “discussion forums” (57%), and “individual reports” (56%) were their favoured assessment methods. Juxtaposing these with participants’ preferred models of learning (“live projects”, “group work”, and “case studies”)

suggests that student agency could be activated through complex problem solving that impacts real people. In such situations, students would be encouraged to work with real-life scenarios to understand the context deeply. Students can frame the problem space in groups before moving on to (co-)design a response or solution. This kind of contribution cannot be assessed or measured by standardised testing or quizzes (which were among the least favoured of respondents’ methods of assessment). Instead, student agency and contribution must be assessed in a way that reflects the transdisciplinary nature of the task and captures the experiential learning that has taken place.

The goals of experiential learning are closely related to learning outcomes, or what Fry et al. (2008) describe as “a middle ground between statements of learning which are considered over-generalised (learning aims) and those which are over-specified (learning objectives)” (p. 28). Respondents ranked these six expected course outcomes (see Table 1) as either “important” or “very important”: “ability to analyse complex scenario-based problems”, “understanding of professional roles”, “ability to work in groups”, “presentation skills”, “critical thinking skills”, and “research skills”. “Critical thinking skills” was clearly identified as the most important outcome, and consideration for creating opportunities for “critical thinking” in assessment design (alongside the other five outcomes) therefore seems essential.

Summary

Community resilience education in HEI settings offers rich opportunities for learning that crosses boundaries between disciplines, sectors and professional perspectives. Participants were clear that programs benefit when professional/practical roles are value, acknowledge, and included. This means taking into account competency-based approaches of industry and recognising the need for higher education to be more responsive to prominent and emerging themes in practice. This learning is in turn strengthened by *both* disciplinary and transdisciplinary perspectives, especially where core and transferable skills are made explicit. We found that HEI offerings in community resilience are seen to be suited to experiential and blended learning models, which both create opportunities for students to work on live projects in a group setting. This can present fertile ground for the activation of student agency through both targeted assessment models and opportunities for active contribution during the learning process.

Conclusions and future research

This paper has explored the fundamental characteristics of learning design for community resilience in HEI programs as described by 111 international, transdisciplinary participants engaged in an online survey. Each section has highlighted the quantitative data uncovered, and findings suggest a preference for scenario-based, transdisciplinary group work that is experiential in nature. This outcome suggests a repositioning of education for community resilience, away from traditional learning, teaching, and assessment methods, and towards a greater focus on transferable, critical thinking, and problem-solving skills.

Drawing on the emerging insights, the paper has discussed a number of significant and interrelated areas of interest: negotiating the academic/practitioner divide, disciplinary expertise and transdisciplinary learning in resilience education, experiential approaches to resilience pedagogy, and student agency and contribution. The research found that community resilience offers rich opportunities for transdisciplinary education, and is well suited to blended learning approaches, which also transcend geographical boundaries that can limit engagement with complex global problems. Students who benefit from community resilience education can potentially develop both academic and professional identities, demonstrate active learning and agency, and contribute to a stronger sense of global citizenship (OECD & PISA, 2018). In each of these areas, learning design recommendations for conception and practice-based approaches to community resilience education in HEIs

have been offered.

In this way, community resilience supports ESD as an inherently transdisciplinary concept that is also a boundary object. Teaching about community resilience in a way that combines social, political, environmental factors, positions it as a theme able to support disciplinary depth, transdisciplinary learning, and systems thinking across sectoral boundaries.

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