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## How Can Initial Teacher Education Tackle "Super-Wicked" Problems?

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### ABSTRACT

The concept of "Super-wicked" problems is attracting increasing attention and scrutiny through research and publication in wide-ranging interdisciplinary areas. The concept is being lionised in the literature to draw attention to the urgency that is required to act immediately on problems such as climate change and sustainability. Importantly, the solutions to super-wicked problems are not based on defeatist attitudes but seek instead to build resilience among key stakeholders specifically to bring about change. This paper charts the internationally unique alignment in Scotland between Scottish Government education policy and the General Teaching Council for Scotland's Professional Standards. In so doing, it distinguishes between the international concept of Education for Sustainable Development (ESD) and the more expansive Scottish concept known as Uearning for Sustainability (UfS). A qualitative case study based on Appreciative Inquiry was adopted to answer the Research Question: "How do students and their Programme Director on a Programme designed to promote teacher activism understand and engage with LfS?" The Programme Director and then four students from the recently-accredited MSc in Transformative Uearning and Teaching (TUT) were interviewed to discover how they were navigating their way through the UfS policy landscape and whether, and to what extent, the Professional Standards for UfS were embedded in the Programme. The study found that all five were very aware of some of the implications of UfS because they valued contested interpersonal relationships, views and ideologies. Furthermore, they advocated the use experiential learning in diverse places in order to include the emotional and cognitive domains of learning. As such, the Programme was found to be an early innovator of UfS implementation, specifically in demonstrating an ethical disposition towards the human community. In keeping with the essential UfS concept of interconnectedness, this study recommends that these ethics should be extended beyond the human community to include care for the non-human. Furthermore, if one of the purposes of the Professional Standards is to embed UfS within Scottish Programmes, and by extension educational responses to sustainability worldwide, the early innovators who are working to embed this into their practices need greater support from the registration bodies responsible for monitoring and enhancing professionalism. Finally, in keeping with the concept of super-wicked problems, in order to bring about systemic change to ITE programmes worldwide, there is a need for additional support from bold, future-thinking, decision makers at all levels of leadership among stakeholders, including universities that offer ITE programmes.

**Keywords** *Appreciative Inquiry, Education for Sustainable Development, Ethics of Care, Initial Teacher Education, Learning for Sustainability, Professional Standards, Super-wicked Problems, Transformational Learning and Teaching.*

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### INTRODUCTION

Following the work of Rittel and Webber (1973), in proposing the concept of "wicked problems", international scholars are increasingly referring to a new class of global problems known as "super-wicked": these tend to be global, large scale, highly abstract, and with far-reaching consequences. Quintessential examples that are commonly referred to in the literature include environmental, social, economic and political problems. Uehtonen, Salonen, Cantell & Riuttanen (2018) have suggested that

sustainability and climate change fall into this category and that interconnectedness, within and between the different kinds of problems, represents the primary reference point in order to understand their scope and magnitude. Uevin, Cashore, Bernstein & Auld (2012: 123) define a "super-wicked" problem whereby "time is running out; – the central authority needed to address it is weak or non-existent; and, partly as a result, policy responses discount the future irrationally". It is now clear that:

climate change science is well developed, relatively coherent in terms of theory and method and capable of measuring, analysing, and assessing what we do and do not know about the environmental consequences of climate change – (however) – by comparison, social scientific research on climate change is more recent, far less coherent, and lacks consensus on either epistemological or substantive grounds (Uevin *et al.* 2012: 123).

There is a paradox in this knowing/not-knowing situation because there now exists the greatest international body of scientific evidence that has ever existed to demonstrate that as a species we are living unsustainably (see, e.g., Intergovernmental Panel Climate Change 2018). Rather than viewing this as an impasse, fresh thinking comes from this paradox when considering Barad's (2007: 26) position that there need to be epistemological, ontological and ethical shifts to understand better these complex entanglements. Barad advances the notion of "agential realism". Specifically, she states that this new philosophical framework "entails a rethinking of fundamental concepts – including the notions of matter, discourse, causality, agency, power, identity, embodiment, objectivity, space and time". These views articulate particularly well with the notion of super-wicked problems because firstly, they reject the reductionist view that humanity is somehow separate from the non-human; and secondly, they challenge the primacy of the scientific method that maintains this separation by objectifying subjects and objects whereby investigators end up as distant spectators of the world around them.

Herein lies a major educational challenge and a question for Teacher Education Institutions (TEIs) across the globe which are responsible for devising and delivering Initial Teacher Education (ITE) Programmes. What sorts of future-oriented thinking and actions might be expected of ITE Programmes in relation to super-wicked problems?

## **THE INTERNATIONAL CONTEXT OF THE ROLE OF TEIS IN DEALING WITH SUPER-WICKED PROBLEMS**

In reviewing the 17 Sustainable Development Goals (SDGs) (2015) it is clear that there is a role for ITE Programmes through Goal 4 which is to "ensure inclusive and equitable quality education and promote lifelong learning opportunities for all". In order to achieve these 17 goals, 169 targets have been set to be met by 2030 and interim targets have also been set for 2020. These targets come under the banner headings of People, Planet, Prosperity, Peace and Partnership (*Transforming our world: the 2030 agenda for sustainable development* 2015).

To understand the urgency of this task it is important to consider that, for a newly-qualified teacher in 2019, 2030 targets should be met within the first quarter of an average career span. Urgency is not the only problem as there is also a need for clarity in delivering these challenging interdisciplinary targets. In reviewing the SDGs, very limited advice is provided regarding the role of ITE other than it should "aim to supply graduates with the readiness and capacity to teach sustainability and global citizenship in schools" (*Global Education Monitoring [GEM] Report 2017: 216*). At the same time, ITE Programmes across the world are currently also subject to additional levels of scrutiny regarding the content of literacy and numeracy and their impact on outcomes for children. This has led educationalists from different countries pointing out that teachers are subject to increasingly regressive levels of regulation through mechanistic approaches to accountability and standardisation (see, for example, Doherty & McMahon 2007; Evetts 2009; Cochran-Smith 2004; Mockler & Groundwater-Smith 2018; Scottish Government 2017).

These outcome-based metrics simply create further tensions for teachers as they wrestle with the competing demands of curricular reform while being part of, and limited by, the neoliberal discourses that create an audit culture which essentially deskills and demoralises the teaching profession (Allen & Sims 2018). Nevertheless, this international assemblage of documents provides TEIs with a very different framework of accountability to that of outcome-based metrics. SDG targets are to be monitored through the *GEM Report* (2017) which states that any "lack of accountability risks jeopardizing progress, allowing

harmful practices (such as neoliberal accountability) to become embedded in education systems"<sup>1</sup>. Thus, the current situation is that international policy statements such as the SDGs (2015) and reporting and accountability initiatives such as the GEM Report (2017), which was subsequently updated in 2019 (GEM, 2019), place learning and education centre stage in response to environmental and human crises. However, while their stated ambition is to transform the world from unsustainable to sustainable lifestyles, it remains unclear what sorts of actions and what sorts of pedagogies might be expected of ITE Programmes to bring about this transformation.

## **THE ROLE FOR TEIS IN DEALING WITH SUPER-WICKED PROBLEMS IN THE SCOTTISH CONTEXT**

The origins of the term "Education for Sustainable Development" (ESD) are now well documented. The UNESCO definition states that:

ESD empowers learners to take informed decisions and responsible actions for environmental integrity, economic viability and a just society, for present and future generations, while respecting cultural diversity. It is about lifelong learning, and is an integral part of quality education. ESD is holistic and transformational education which addresses learning content and outcomes, pedagogy and the learning environment. It achieves its purpose by transforming society (UNESCO. 2019).

The international concept of ESD is first and foremost something developed by world leaders in political and economic forums. The problem with this, as McKeown (2006: 12) has pointed out, is that:

unlike most education movements, ESD was initiated by people outside of the education community – (thus) the concepts and content of ESD in these cases are developed by ministries, such as those of environment and health, and then given to educators to deliver.

However, Scotland, where Ministries have an interest in Uearning for Sustainability (UfS)<sup>2</sup>, is the first country to depart significantly from the ways that ESD have developed elsewhere. One important reason for this departure is that the policy development for UfS was carried out by Advisory and Implementation Groups, each with an independent Chairperson, and the General Teaching Council for Scotland (GTCS) was involved throughout (*One Planet Schools Report 2012*; *Vision 2030+ 2016*).

The uniqueness of UfS as a concept is that it brings together all the elements of ESD and Global Citizenship but also of Outdoor Uearning (OU) (Higgins & Uavery 2013). As such, UfS has been adopted by the Scottish Government as the favoured term (*One Planet Schools Report, 2012*). Higgins & Uavery (2013) suggest that UfS should be integrated within the whole education system and not just in schools. In this respect, UfS shares UNESCO's main purpose for ESD which is to challenge the status quo by insisting on the need for transformative education, the purpose of which is to help young people to understand, envision and act positively to secure a sustainable future.

A key Scottish document that explicitly brings these concepts together in educational policy and practice is *Vision 2030+: The Concluding Report of the Learning for Sustainability National Implementation Group* (2016). This document notes that embedding UfS within the GTCS Professional Standards in 2013 was a major success in helping teachers and managers to develop "a whole-school, system wide commitment that focusses on developing the knowledge, skills, attitudes, values and practices needed to take decisions which are compatible with a sustainable future in a just and equitable world" (GTCS 2019).

As is the case with the SDGs and the GEM report, it is important to point out that the GTCS does not prescribe how this ambitious vision should be implemented and so it is left largely to schools, Uocal Authorities and Universities to decide how they will respond to this challenge. In Higher Education settings, the GTCS has oversight of curricular developments because it is responsible for approving any new or revalidated ITE Programmes, and it can also ask for resubmissions if the TEI does not pay sufficient attention to the core Professional Standards of Values, Ueadership and UfS.

On the face of it these are significant developments because, as recently as 2006, Higgins & Kirk (2006) reported that teacher education had no explicit recognition in the national sustainability policy and had also weak political support. Even more recently the situation was much the same with Higgins & Uavery (2013) noting that there was no requirement for TEIs to include UfS as part of their Programmes.

<sup>1</sup> Quoted from the Director-General of UNESCO Irina Bokova's foreword.

<sup>2</sup> For example, the *Vision 2030+ Report* (2016) was accepted in full by three Ministries - Education, Sciences and Scotland's Languages; Environment, Climate Change and Land Reform; and International Development and Europe.

Consequently, the developments that have happened since 2013 provide Scotland with an opportunity to develop UfS so that it is systemically embedded within ITE approval systems.

From a policy perspective, it is important to note the unprecedented nature of an attempt to establish an educational response to address interconnected planetary issues. The urgent need to develop educational responses, and the challenges for those charged with devising and implementing them, remain complex and immensely ambitious. We were therefore keen to find out whether enshrining UfS in educational policies and teaching standards has been sufficient to bring about transformational practices and pedagogies in a University setting.

## **METHODOLOGY**

This study was based on a single case study of the recently accredited MSc in Transformative Learning and Teaching (TUT) at the University of Edinburgh's Moray House School of Education. It is important to point out that this is an exploratory study and no statements or claims can yet be made about the efficacy of this Programme in producing transformational teachers because the research was conducted before the first cohort of students graduated.

The Programme is a futures-oriented full Masters ITE Programme which explicitly aims to "educate and prepare teachers who are able to teach and transform the learning and future outcomes of children and young people in Scotland" (University of Edinburgh 2018). The intention is to focus on cultivating an activist profession, taking account of macro and mezzo policy contexts and, for the reasons explored in the literature, one could expect that UfS might permeate each of the courses. The cohort number was 25, which included culturally diverse individuals from a range of backgrounds, ages, degrees and previous occupations. Study on the Programme includes time spent engaged in both university-based learning and site-based learning. However, unlike traditional block school placements, students engage in site-based learning throughout the duration of their studies in order to facilitate the depth of learning that Darling-Hammond & Bransford (2005) suggest comes about in, through and for practice.

The research consisted of two phases. The first phase involved three of the researchers (two female and one male) meeting with the PD to gain a teacher educator's perspective on UfS and to negotiate student access. This was an unscripted conversation (Huberman & Miles 2002) which is a strategy that allows different participants (in this case both the researchers and the PD) to offer their opinions on the same subject. This conversation opened with the question "can we discuss what we each understand by the term UfS and then look at how it appears in the MSc TUT"? Prompts were used throughout the conversation to ensure that the focus remained on UfS. The conversation that followed lasted an hour and a half and was recorded and fully transcribed.

The second phase involved a follow-up group interview conducted by the same three researchers who interviewed four student teachers who agreed to be research participants. We adopted a non-probability sampling technique and, in the tradition of purposive sampling (Newby 2010), we asked the Programme Director (PD) which students might best be able to talk about UfS and were provided with the names of three females and one male, all of whom agreed to be interviewed. Drawing on Newby's (2010) definition of an interview spectrum, which ranges from structured, semi-structured and evolving interviews, we adopted a semi-structured interview approach to provide a series of questions for the students that ensured the focus remained on UfS. However, we also provided opportunities for unprompted themes to emerge. The questions were circulated to the four interviewees in advance of the interview so that they were aware of what would be asked. These are known as collective interviews, a format that allows for more than one person being interviewed at the same time. The benefits of this approach are based on the "likelihood that the interactions between the respondents will provide more useful data" (Newby 2010: 349). The lead interviewer adopted a moderating role to follow Coleman's (2012) advice to allow everyone to speak without any one person dominating the interview. To ensure accuracy in transcription and in attributing contributions accurately, each student said their name every time they spoke.

The students were provided with pseudonyms to ensure anonymity. However, given the vicinal nature of ITE providers in Scotland, it was inevitable that this close proximity would mean that the PD could be readily identified by others working in the sector. The researchers therefore sought and received approval from the PD to be named. This is based on the ethical principle of "autonomy" where the PD has with "free consent" agreed to participate knowing they could be identified (Hammersley & Traianou 2015). This knowing and sharing form of relationship between the researcher and the researched is consistent with

forms of Action Research where participatory engagement is essential in order for researchers to research with and not on participants (Reason & Bradbury 2006, Nicol 2014a).

This relationship building also helped with achieving trustworthiness (Uincoln & Guba 1985), to improve the credibility of truth claims. The PD and the 4 students were provided with drafts of the paper to comment on our analysis. In this we followed Holstein and Gubrium's (1995) advice on the active interview whereby it was viewed as a joint construction of meaning between the interviewer and the interviewee. We also provided assurances that our research was not developed from deficit models of enquiry that sought to critique and find fault with existing practice. This was important because conducting research within our own School with colleagues and students whom we already knew presented us with challenges. For example, given the urgency, complexity and intractable nature of dealing with super-wicked problems, it would have been a relatively straightforward exercise for us, or indeed anyone, as researchers simply to critique the Programme for what was absent in terms of UfS. However, instead of following this sort of deficit model we adopted an Appreciative Inquiry (AI) approach in order to research with, and not on, the students and their PD. Our enquiry background was based on Norum's (2008: 4) view that "the profound differentiator of AI compared with other research methods is AI's deliberate focus on the creative, generative, and positive aspects of a system (individual or collective)". As such, we looked not just for *what is* but *what could be*. We wanted to engage with what Uewis, Passmore & Cantore (2011) have referred to as emerging and unfinished conversations. This methodological approach dovetails well with the UNESCO (2005) view that the selection of methods of inquiry are important specifically to avoid imposing the concept of UfS on others.

We then followed the guidance of Thomas & Myers (2015) in choosing a single case study in order to provide an in-depth illustration of the experiences of one Scottish ITE provider in integrating UfS into a Masters-level ITE Programme. Case study is important not only as a qualitative methodology but also as a means of drawing attention to contextual, applied responses to educational matters; it is a way to counter the reductive "best practice" discourse (Mockler & Groundwater-Smith 2018).

That said, among the concerns often raised in relation to case studies are matters of generalisation, validity and the tussle between theoretical and practical knowledge (Flyvbjerg 2006). As our intention was to gain nuanced insights into and understandings of the embeddedness of UfS policy in one newly-devised Programme, we suggest that there is merit in acknowledging the singleness of a case and the advantages that come with the interrogation of one context (Thomas & Myers 2015). Our thinking contrasts sharply with the position that a case should be thought of as a universally applicable example. In addition, being, and remaining, alert to the verification of "preconceived notions and theories" (Flyvbjerg 2006 :236) was for us a guiding principle throughout the research design.

Given the desire not to be overly prescriptive in our enquiry, and to be responsive to the views of those we interviewed, we adopted a broad-brush approach to developing the following overarching research question:

*How do students and their Programme Director on a Programme designed to promote teacher activism understand and engage with LfS?*

## **INTERVIEW WITH PROGRAMME DIRECTOR**

The literature reviewed above shows how UfS is an emerging concept and remains, as yet, potentially elusive. This makes it particularly interesting and challenging as an interview topic, particularly when seeking to determine if the interviewees and participants are talking about the same thing. Furthermore, because it is elusive, it is not clear how teacher educators will know if they are teaching UfS and, by extension, how they will know if their students are learning UfS. This "Gordian Knot" surfaced when the PD reported that UfS had not been discussed very much on the Programme so far. However, throughout the interview the PD reported several relevant learning episodes which she characterised as "quite powerful". One was an Outdoor Learning (OU) session that combined literacy and its associations with outdoor places (n.b. as described above, learning outdoors is a core expectation of UfS). The second was through an assignment task in which students had been asked to explore their own identities and evaluate their developing practice using the GTCS Professional Standards. The OU session resulted in students with varied subject specialisms exploring different pedagogical perspectives by thinking about delivering their subjects in an unfamiliar place (the outdoors). So, although UfS had not been discussed explicitly to

any great extent on the Programme by this point, these examples are significant firstly, because connections were being made between subject disciplines (a key dimension of UfS as something interdisciplinary); and secondly, they referred to different places of learning (another key dimension of UfS), such as lecture rooms, outdoor settings and the constant toing and froing between University and site-based contexts. At the time of writing the inclusion of UfS within the GTCS Professional Standards is being developed further and the new iteration is expected in 2019 which will have significant implications for ITE Programmes. This is a point we return to in the concluding comments.

Drawing on the shared experiences from the OU sessions that ended in the pub where "it was a social time for staff and students to be together", the PD talked about the importance of teambuilding and bonding within the group. Another example was based on how the students used Facebook:

*(The students) tell me a lot of what's on it and they use it if there are times (when) I say, "Oh I really must...". And they say, "It's fine, I'll do it, one of us will do that". So it's not seen as a secret space where they don't communicate with us (staff).*

It is clear that the PD values the importance of interpersonal relationships, not only because of their instrumental value in furthering learning, but also as ends in themselves. The latter point came to light through an example where controversial issues were being discussed in a lecture and the manner in which students shared their views with their lecturers and then mediated group behaviour among themselves.

*I see people who are very vocal and then others are concerned about how ... (what is said in conversation) ... impacts on me and try to mitigate that ... some students will find a way to say really nicely, "I'm not sure if I'm comfortable about (what is being said) ". There's a sense of care for us as a community. And if the students think any of the course tutors have been treated poorly, if anyone's been rude to them, someone will always bring that up and it isn't in a tittle-tattle way.*

This is evidence of critical engagement between students and their lecturers as they navigate complex interpersonal relationships while engaging in issues that have no common agreement, and this resonates with the nature of super-wicked problems. It is therefore clear that some students care deeply that their

lecturers might be hurt from responses they receive during group discussions or when introducing controversial ideas. From these data it can be seen that interpersonal relationships were being valued in their own right, and there was clear evidence of attempts to ameliorate any student/lecturer power imbalance from the outset. Nodding's (2005) concept of "ethics of care" is of interest and relevance here as it prioritises relational aspects of care, in educational settings and, as Biesta (2016) suggests, can be adopted as a counter to neoliberal discourses of performativity and competitiveness discussed in the

literature. It is significant that the PD chose to focus on the students' collective desire to negotiate interpersonal relationships. Hence the depth of students' engagement with what might be considered an ethic of care is difficult to contest. This therefore is the dominant theme that emerged from this interview as it highlighted the importance of how students and staff might, and perhaps should, be with one another.

This is a key finding because, as the literature review demonstrates, it is pointless for educators to deploy passive and deficit pedagogical models because their negative approaches, as noted below, simply end up with learners listing the countless ways that people live unsustainably on the planet. Consequently, if the teaching profession is to align itself more closely with these challenges, then it is clear that those with the responsibility for leadership of ITE Programmes need to consider how to recruit actively the "right" people to become teachers, namely people who are already predisposed to such ethics. Furthermore, the notion of care that is so clearly evident in the human interactions could act as a bridge that leads more purposefully to include the nonhuman. Goralnik, Millenbah, Nelson & Thorp (2012: 420) have pointed out that "while we learn how to inhabit care in relationship with other humans, we can translate the feelings

these relationships engender into relationships with nonhuman nature and ideas". But, for the urgent reasons outlined above, we would recommend that this cannot be left to accident or chance if the moral imperatives associated with care for self and others are to be extended to include care for the planet. For this to happen, a fundamental shift is required towards the sort of "agential realism" that Barad (2007) referred to in order to overcome the binary that separates the human from the non-human and keeps care

for the planet at a distance from care for people. It is also this sort of onto-ethical epistemological shift that is required if the complexity, interconnectedness and urgency of super-wicked problems is to be understood better and deployed in the provision of ITE. If this finding is adopted within the provision of ITE, it is clear that rich pedagogical possibilities for UfS emerge when contested ideas, roles and

relationships, contextualised in different spaces and places, involving people and planet are held in creative tension.

This interview provided insights into processes and places important to UfS from the PD's perspective. Furthermore, it was apparent that there were different levels of knowledge and engagement among the student cohort, and so in terms of UfS, and in keeping with the methodological underpinnings of AI, there are reasons to be hopeful. According to the PD the students were enthusiastic and keen to embrace alternative ways of constructing pedagogy and practice. While their reimagining of schools was still in development, the discussion suggested that the students' ideas were not based on the reproduction of power, nor the production of human capital, that Wrigley, Uingard & Thomson (2012) warned against. With this come opportunities to introduce the sorts of alternative pedagogies required for UfS. For example, the PD suggested that the students attached a great deal of importance to the idea of "living well". This relates to Barad's (2007: x) idea that:

there is only the ongoing practice of being open and alive to each meeting, each intra-action, so that we might use our ability to respond, our responsibility, to help awaken, to breathe life into ever new possibilities for living justly.

This is not to suggest that it is only process and not content because subjects are important to UfS (Gosselin, Egger & Taber 2019). It is though a call to transcend conventional understandings of intra-actions among people to include the ontological inseparability between meaning and matter, and people and planet.

## **INTERVIEW WITH STUDENTS**

Following the interview with the PD it seemed clear that there was more to be gained in furthering our enquiry by interviewing students deemed to have a greater understanding of UfS than others. As described in the Methodology section above a non-probability sampling technique was used and the PD provided us with the names of three females and one male, each of whom agreed to be interviewed. To ensure anonymity, the student participants were given pseudonyms and are referred to here as Ruby, Callum, Claire and Gemma. The themes that emerged from the interview with the PD, and which we brought to the student interview, are listed below. These are:

- understanding TUT and UfS
- the cognitive and affective domains
- places of learning
- the teaching of UfS.

### *Understanding TLT and LfS*

As the literature suggests a major underlying assumption of UfS is that it should provide educational responses that encourage the movement from unsustainable lifestyles and societies to something more sustainable. In keeping with AI, and the need to begin with participants' understandings, we focussed the opening interview questions on a term with which the students were familiar. We asked what "transformative learning" (part of the title of their Programme) meant to them and all four referred to the importance of community activism. Ruby explained that "It's good to have a \_ community \_ of people that \_ have \_ like-minded interests or values". Callum wanted to make a difference within a community while Claire asserted that it "was your duty to be political and your duty to be caring about the community and the wider impact of what you were doing". Gemma noted, insightfully, some preconditions and stated that "school is and could be a transformative place for children, but I would like that to be more positive than it maybe is at the moment".

These views suggest that a school should not be something that is hermetically sealed from wider society, but rather something with free-flowing information, knowledge and action between the two. However, this reciprocity was understood by the students to be in need of greater moral scrutiny as both schools and society were deemed to be something characterised by social injustices and inequalities. It is not surprising that students enrolled on a Programme with the term "transformative learning" as part of its title would think this way. Also, from an UfS perspective, it is heartening that students recognise the importance of activist stances in relation to their Programme experiences and the sorts of schools in which they want to work.



An interesting distinction can be made between the way students talked about their personal and professional selves. With regard to personal responsibilities, Claire stated that "the learning for sustainability part – that's my priority personally". Gemma stressed the need for "making choices about the things that we buy". These statements echo findings from a study in Sweden involving 323 teacher education students which reported that personal responsibility was one reason that students were willing to engage in sustainability issues (Andersson, Jagers, Uindskog & Martinsson, 2013).

It is becoming increasingly clear from these data that taking personal responsibility is a central component of UfS pedagogy. In this respect, Gemma said that it mattered "the way that we act towards other people (going) beyond our own selfish learning outcomes and (curricular) success criteria". However, there was also recognition that the personal, professional and social needed to interact. Ruby felt that some of her previous personal experiences had been quite isolating: "For me at school learning was very much separate from everything around me". Claire said: "It's bigger, (it requires) developing professional learning .", while Gemma explained that "in terms of – learning alongside children, (it's about) how to live sustainably in the world that we live in". Ruby recognised the need for "awakening children to – the world around them". Responding to a draft of this paper, Gemma reflected on the need for the sort of stability that comes from being rooted in a school and its wider geographical community in order to develop rights, roles and responsibilities that are necessary for transformative action.

It is clear from these data that the students are very aware of some of the implications of UfS, not least that it requires knowledgeable and committed teachers. It is also clear that these students are favourably disposed to act as change agents. However, what is less clear from these data are the competencies, knowledge base and qualities that are required to deliver UfS. This is something that we return to in the concluding section.

### *The cognitive and affective*

The students were asked how important they thought the cognitive and affective domains were for UfS. The questions and their prompts were designed to probe whether they believed one might be more important than the other in relation to UfS. As stated above, the reason for including these questions arose from themes that emerged from the interview with the PD which correspond with the literature that suggests that few curricula "actually approach the teaching-learning process holistically and intentionally deal simultaneously with both the cognitive and the affective domains" (Uozzi 2010: 8). All students agreed that the two were in some way related and that they cannot be separated. This is not surprising as it mirrors long-established traditions in teacher education theory (see for example Bloom 1956; Bloom, Krathwohl, & Masia 1964). An epistemologically diverse view was expressed by all and was summarised by Callum thus:

we're thinking about these issues – in terms of how we operate in the world and we're trying to, find answers for ways – to live in a – sustainable – way – I think it is that interplay between feeling and thinking because – we're thinking about how (and) where our food (is) coming from – and we feel a certain way, like we – don't want to partake in certain systems that are potentially problematic so I think there is an interplay between these things.

In exploring the function of emotion in learning Goralnik *et al* 2012) agree that affective and cognitive learning are part of the same process. However, as a result of the powerful urges that come with feeling, they argue that affective learning is particularly relevant as a hook to attract, direct and capture that to which learners pay attention. This is because affective learning promotes forms of engagement that require social interaction and full-body engagement. What the students in this interview were describing fits the view that "full-sensory learning experiences – stimulate emotional engagement because they foster meaning-making (and promote) the development of personal and intellectual meaning through reflection and group processing" (Goralnik *et al.* 2012: 415). But these authors also warn that developing emotional maturity has traditionally proved difficult for institutions and their curricula. These points are important because they help to distinguish between ethical positions that are theoretically passive as opposed to those that are action oriented. As Goralnik, *et al.* (2012: 416-417) point out:

this distinction is important for a theory of environmental ethical learning that aims not just to provide knowledge about ethics and the environment, but also to cultivate both an understanding of environmental ethics' role in

problem-solving and a personal and collective motivation to participate in the address of environmental issues (italics added for emphasis).

The busy interview schedule resulted in insufficient time for a deeper discussion of epistemological diversity. It is clear from the data, however, that the students understand the primacy of emotions as a necessary precondition for transformative learning and teaching. Although the literature suggests that the development of notions of care requires a greater focus on the affective domain, it was not within the scope of this study to determine the pedagogical practices that might promote it. This is something that we return to in the concluding section.

### *Places of learning*

The PD noted above that places of learning were important to UfS, which led to the students being asked about their views on this. For Callum, the "experiences in my life that I've found the most formative have been through the aspect of – outdoor learning", and he believed that the curriculum should provide time for "these spaces and to explore these spaces with (pupils)". Noting the limitations of learning indoors, Ruby concluded: "I do think place is really important and it's something that I've not seen enough (discussion of)". There was also an acknowledgement that education indoors was simply convenient and a response to the educational needs of Victorian times (Gemma).

There is a growing body of literature that provides a clear rationale for education that takes place outside the classroom and the lecture theatre. Beames, Higgins & Nicol (2012) argue that such learning brings the curricula alive, promotes UfS opportunities and encourages health and well-being through physical activity. Furthermore, being outdoors provides opportunities for nurturing an ethical position. Buchanan (2012) highlights the importance of field trips and "town planning" exercises to promote interdisciplinarity. Aldo Leopold (1989: 214) famously argued that "we can be ethical only in relation to something we can see, feel, understand, love, or otherwise have faith in". Nicol (2014b) developed this idea by pointing out that the moral significance of our relationships with outdoor places are determined by direct proximity with them and the experiential attention we pay to them. These phenomenological arguments are a clarion call for more OU.

### *The teaching of LfS*

The students were asked what teaching UfS in a school might look like, a question which was included to allow us to gain insights into how they were making connections between learning on their Programme and their observations of, and experiences within, the school context. This is in keeping with Recommendation 2 of the *One Planet Schools Report* (2012: 28) which states that "in line with the new GTCS Professional Standards, every practitioner, school and education leader should demonstrate learning for sustainability in their practice". The students offered various suggestions, such as staffrooms with fair-trade products and recycling bins placed around the school. While the students noted that this should not be a "tick box" exercise it is notable that the examples chosen could be perceived as such.

However, as the literature above indicates, the magnitude of reorienting schools towards UfS requires not just extraordinary energy and vision but starting points. For Callum, the opportunities to make wider connections from the school as a base were endless when he said that "you can start with the local, there's not a space in Scotland that's not been affected by either globalisation or industrialisation – and how people have lived in relation to the land".

The difference between visions and starting points presented here have already been identified in the *One Planet Schools* report (2012) where tensions exist in schools, and where UfS ends up competing for space in the curriculum alongside the drive to improve attainment in literacy and numeracy. This report also noted the problems that arise where schools rely overly on the efforts of individuals, and the students believed that something more systemic was required to shift the reliance on individual advocates towards a more structured approach to embedding UfS within the school culture. However, as the data analysis above have already suggested, schools in themselves cannot deliver UfS unless they engage with wider communities. Indeed, the *One Planet Schools Report* (2012: 17) report states that:

learning for sustainability involves learners actively participating in environmental stewardship, social justice and democracy in ways that develop a sense of connection to the local, national and global community to build understanding of their own and the school's role within these communities.

## DATA ANALYSIS SUMMARY

These data from the two phases show some of the UfS possibilities that emerge from teaching and learning that:

1. welcome contested interpersonal relationships, views and ideologies;
2. value and actively engages in different places of learning (not just lecture rooms, but in the outdoors and through "site-based learning" at schools);
3. work reciprocally with cognitive and affective domains;
4. deepen the role of emotional learning and the ethical understanding of values through experiential engagement;
5. promote an ethical position that is action-orientated as well as theoretical;
6. recognise that lecturers and students are co-constructors of knowledge.

## CONCLUSIONS AND RECOMMENDATIONS

We sought to answer the Research Question *How do students and their Programme Director on a Programme designed to promote teacher activism understand and engage with UfS?* While the possibilities arising from points 1-6 are essential to UfS, it is important to point out that they are not exclusive to UfS and so will not necessarily lead to UfS. This cannot be addressed properly unless UfS is understood to be rooted in other ways of thinking and knowing in addition to those currently employed. As an advocate of interdisciplinarity, Aldrich (2014) argues that it is the model on which the academy of the 21<sup>st</sup> Century should be based, but warns that it may not be welcomed within disciplinary structures. Furthermore, Moran (2010) warns interdisciplinarity has become a buzzword meaning different things to different people. Consequently, the conceptual underpinnings of interdisciplinarity are underdeveloped and require critical interrogation, something that Humes (2013) and Priestley & Minty (2013) have said applies equally in relation to Scotland's Curriculum for Excellence (CfE).

Since interdisciplinarity relies to a large extent on subject disciplines, it is important to point out that creating opportunities for genuine interdisciplinary learning and teaching is not simply a case of organising wide-ranging disciplinary subjects so as they can be taught together. It moves beyond the mere proximity of subjects to one another and, in keeping with super-wicked problems, demands "a more radical questioning of the nature of knowledge itself and our attempts to organize and communicate it" (Moran 2010: 13). As indicated above, UfS and interdisciplinarity share the same epistemological position in that social and ecological problems cannot be solved within disciplines. We are therefore left with a significant question. The GTCS (2012) defines UfS as "learning to live within the environmental limits of our planet and to build a just, equitable and peaceful society". In the absence of detailed guidance, what does this really mean and, importantly for this study, what might it look like when taught?

Tomas, Grgenti & Jackson (2017) have highlighted the limitations of stand-alone teaching units. This is consistent with the GTCS Professional Standards where UfS is intended to be embedded and represent the core permeating principle throughout the curriculum. Buchanan (2012), along with many others (e.g. Sachs 2003), has noted the need for an activist profession which is characterised by teachers as agents for change. The data here support that claim with both the PD and each of the students recognising the need for being an activist who is prepared to adopt and enact a principled, informed stance. However, there are crucial ingredients missing that require urgent strategic attention. As the result of a synthesis of literature Evans, Stevenson, Uasen, Ferreira and Davis (2017: 407) have concluded that:

precisely how student teachers acquire the professional knowledge, practice and engagement standards of graduate teachers, however, is largely left to universities, course/program teams, and individual lecturers, making for a relatively ad hoc approach across the nation (Australia). Even though sustainability may be mandated within school curricula, SE (sustainability education) is not a mandated component of initial teacher education or teacher professional standards, in most countries, and, hence, can be easily disregarded.

The analysis of the data we have presented suggests that the students and their PD are early innovators in the development and embedding of UfS within an ITE Programme. However, the data presented are from one small case study. If this Programme is characteristic of others, then to bring about systemic change to ITE Programmes within Scotland, and internationally, will require additional support from bold, futures-thinking decision makers at institutional levels, including universities that offer ITE Programmes. Without such thinking, the ad hoc approach described by Evan's *et al.* (2017) will prevail.

It is instructive to note that Evan's *et al.* (2017) found that Scotland was the only country to include sustainability in teacher professional standards. This leads to a further element that requires urgent strategic attention. Despite the existence of UfS in the GTCS professional standards, it appears that Programmes are still approved where UfS is an "add on" rather than being fully embedded within the ITE curriculum. With the possibility of the GTCS developing a new iteration of the Professional Standards (expected 2019) there is an opportunity to consider more stringent mechanisms for the validation and revalidation of courses and Programmes. If a Programme submitted for accreditation to the GTCS does not have UfS clearly embedded within its criteria and content, the GTCS should have the right to refuse accreditation until UfS is clearly embedded. Given the importance of ensuring that teachers are equipped to support children, and young people, to become literate and numerate, it is almost unthinkable in the current political climate that Programmes devoid of clarity on these elements would be accredited. Conferring the same compulsory status to UfS, and pedagogies which contribute to developing knowledge and understanding on combatting unsustainable lifestyles, would draw attention to the magnitude and urgency of super-wicked problems and the need to act on them.

It is therefore a strong recommendation of this study that universities around the globe, and organisations in each country responsible for national professional standards (where they exist), should engage in an activist stance and advocate for change at all levels of leadership, rather than simply leaving implementation to delivery-level activists. Despite strong governmental support, inclusion in the Professional Standards and the backing of UNESCO, the implementation of UfS in this Programme remains at an early stage. This is consistent with findings from the international literature. It is therefore important to identify clearly that this is an interrelated tripartite problem involving ITE providers, bodies responsible for professional standards, and national government policies. It seems unforgivable that any nation which has a commitment to social justice, and is concerned about the opportunities afforded to its children, would not act on the evidence now available. It is for these reasons, together with the lack of urgency, that we have characterised educational responses to sustainability as a super-wicked problem. As TEIs and their ITE Programmes throughout the world come to terms with what this means, they do so without a blueprint of how to proceed.

In our research we wanted to work alongside students and their PD to understand their sphere of influence, to think about professional standards for the individual teachers, and to consider the well-being of the becoming teachers, their peers, and colleagues and pupils in schools. To do this successfully we had to deal with the paradox that whatever we found would not have the urgency that super-wicked responses demand. Put another way, and in keeping with AI, we did not want to project urgency onto others, but rather to encourage urgency to emerge from our research process. As we have noted above no statements or claims can yet be made about the efficacy of the Programme in producing transformational teachers of UfS since there have, as yet, been no graduates. In Deweyian terms, before we could consider any "continuity of learning" we had first to find starting points. We believe that approaching sensitive research through AI will be of value to those engaged in researching TEIs internationally.

What we learned from these students was that their starting points were based on a strong ethical understanding of both self and others. This is apparent in the way they talked about the importance of care. It was also clear that more consideration needs to be given to attract aspirant teachers onto ITE Programmes who are already predisposed to thinking about, and have a preparedness to engage in, teaching as a political and intentionally transformative act, as these students clearly are. It is also essential to consider more seriously how these dispositions in relation to teaching and learning might be nurtured during ITE Programmes generally.

Could it be that learning for a better future starts from an ethic of care? It is a standpoint with which these students are already familiar, and towards which they are disposed. It would appear that their espoused values position is currently based on knowing oneself, and having an informed position on social justice, including the outcomes of inequality. If this is the case then perhaps one key role for ITE Programmes is to find, create and use spaces, literal and metaphorical, in order to extend this ethical position to include relationships with the planet. This would include a greater understanding of UfS as a concept but, more importantly, nurture the deep experiential engagement required to translate care for self and others into practices that have caring for the planet at their heart. However, this will not happen without an onto-ethical epistemological shift, and Barad's (2007) agential realism is one way of extending

care for the human community to include the non-human. This is a non-negotiable position if UfS is to be incorporated successfully into ITE Programmes.

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## REFERENCES

- Aldrich, J. (2014) *Interdisciplinarity. Its Role in a Discipline-Based Academy*, New York: Oxford University Press.
- Allen, R. & Sims, S. (2018) *The Teacher Gap*, Uondon: Routledge.
- Andersson, K., Jagers, S.C., Uindskog, A. & Martinsson, J. (2013) Uearning for the Future? Effects of Education for Sustainable Development (ESD) on Teacher Education Students. *Sustainability* 5, 5135-5152.
- Barad, K. (2007) *Meeting the Universe Halfway: Quantum Physics and the Entanglement of Matter and Meaning*, Uondon: Duke University Press.
- Beames, S., Higgins, P. & Nicol, R. (2012) *Learning Outside the Classroom: Theory and Guidelines for Practice*, New York: Routledge/Taylor and Francis Group.
- Biesta, G. J. J. (2016) *Good Education in an age of Measurement: Ethics, Politics and Democracy*, Abingdon: Routledge.
- Bloom, B. S. (eds.) (1956) *Taxonomy of Educational Objectives: Book 1 Cognitive Domain*, Uondon: Uongman.
- Bloom, B. S., Krathwohl, D. R. & Masia, B. B. (eds.) (1964) *Taxonomy of Educational Objectives: Book 2 Affective Domain*, Uondon: Uongman.
- Buchanan, J. (2012) Sustainability Education and Teacher Education: Finding a Natural Habitat? *Australian Journal of Environmental Education*, 28(2), 108-124. <http://dx.doi.org.ezproxy.is.ed.ac.uk/10.1017/ae.2013.4>
- Cochran-Smith, M. (2004) The Problem of Teacher Education, *Journal of Teacher Education*, 55(4), 295-299.
- Coleman, M. (2012) Interviews. In A. Briggs, M. Coleman & M. Morrison (eds.) *Research Methods in Educational Leadership and Management*, 250-265. Uondon: SAGE.
- Darling-Hammond, U. & Bransford, J. (eds.) (2005) *Preparing Teachers for a Changing World: What Teachers Should Learn and be Able to do*, San Fransisco: Wiley.
- Doherty, R. A. & McMahon, M. A. (2007) Politics, Change and Compromise: Restructuring the work of the Scottish Teacher, *Educational Review*, 59(3), 251-265.
- Education 2030 Incheon Declaration and Framework for Action (2015), Online at [http://uis.unesco.org/sites/default/files/documents/education-2030-incheon-framework-for-action-implementation-of-sdq4-2016-en\\_2.pdf](http://uis.unesco.org/sites/default/files/documents/education-2030-incheon-framework-for-action-implementation-of-sdq4-2016-en_2.pdf) (accessed 5/3/19).
- Evans, N (S)., Stevenson, R.B., Uasen, M., Ferreira, J-A. & Davis, J. (2017) Approaches to Embedding Sustainability in Teacher Education: A Synthesis of the Uiterature, *Teaching and Teacher Education* 63, 405-417.
- Evetts, J. (2009) The Management of Professionalism. In S. Gewirtz, P. Mahony, I. Hextall & A. Cribb (eds.) *Changing Teacher Professionalism: International Trends, Challenges and Ways Forward*, Abingdon: Routledge, 19-30.
- Flyvbjerg, B. (2006) Five Misunderstandings About Case-study Research, *Qualitative Inquiry*, 12(2), 219-245.
- General Teaching Council for Scotland (2012) Online at <http://www.gtcs.org.uk/UearningforSustainability/lfs-what-is-lfs.aspx> (accessed 5/3/19).
- General Teaching Council for Scotland. 2019. Professional Standards. [ONUINE] Available at: <https://www.gtcs.org.uk/professional-standards/professional-standards.aspx>. [Accessed 27 May 2019].
- Global Education Monitoring Report (2017) *Accountability in Education: Meeting out Commitments*. Online at <http://unesdoc.unesco.org/images/0025/002593/259338e.pdf> (accessed 5/3/19).
- Global Education Monitoring Report (2019) *Migration Displacement & Education: Building Bridges not Walls*, Online at <https://en.unesco.org/gem-report/taxonomy/term/210> (accessed 5/3/19).
- Goralnik, U., Millenbah, K., Nelson, M. & Thorp, U. (2012) An Environmental Pedagogy of Care, *Journal of Experiential Education*, 35(3), 412-428.
- Gosselin, D. Egger, E. & Taber, J. (eds.) (2019) *Interdisciplinary Teaching and the Earth and the Environment for a Sustainable Future*. Switzerland: Springer Nature. <https://doi.org/10.1007/978-3-030-03273-9>
- Hammersley, M. & Traianou, A. (2015) *Autonomy and Informed Consent. Ethics in Qualitative Research: Controversies and Contexts*, Uondon: SAGE. <https://dx.doi.org/10.4135/9781473957619>
- Higgins, P. & Kirk, G. (2006) Sustainability Education in Scotland: The Impact of National and International Initiatives on Teacher Education and Outdoor Education. *Journal of Geography in Higher Education*, 30(2), 313-326.
- Higgins, P. & Uavery, A. (2013) Sustainable Development Education. In T. Bryce & W. Humes, D. Gillies & A. Kennedy (eds.) *Scottish Education – 4<sup>th</sup> edition*, 337-342. Edinburgh: Edinburgh University Press.
- Holstein, J. A., & Gubrium, J. F. (1995) *The Active Interview*, Uondon: Sage.
- Huberman, A. M. & Miles, M. B. (eds.) (2002) *The Qualitative Researcher's Companion*, Uondon: Sage.
- Humes, W. (2013) Curriculum for Excellence and Interdisciplinary Uearning, *Scottish Educational Review*, 45(1), 82-93.
- Intergovernmental Panel Climate Change (2018) Online at <https://www.ipcc.ch> (accessed 5/3/19).

- Uehtonen, A., Salonen, A., Cantell, H. & Riittanen, U. (2018) A Pedagogy of Interconnectedness for Encountering Climate Change as a Wicked Sustainability Problem, *Journal of Cleaner Production* 199, 860-867. <https://doi.org/10.1016/j.jclepro.2018.07.186>
- Ueopold, A. (1989) *A Sand County Almanac: and Sketches Here and There* - Special Commemorative Edition, Oxford: Oxford University Press.
- Uevin, K., Cashore, B., Bernstein, S. & Auld, G. (2012) Overcoming the Tragedy of Super Wicked Problems: Constraining our Future Selves to Ameliorate Global Climate Change, *Policy Sciences* 45, 123-152.
- Uewis, S., Passmore, J. & Cantore, S. (2011) *Appreciative Inquiry for Change Management. Using AI to Facilitate Organizational Development*, Uondon: Kogan Page.
- Uincoln, YS. & Guba, E. G. (1985) *Naturalistic Inquiry*, Newbury Park, CA: Sage Publications.
- Uozzi, U. (2010) What Research Says to the Educator: Part One: Environmental Education and the Affective Domain. *The Journal of Environmental Education* 20(3), 3-9. <https://doi.org/10.1080/00958964.1989.9942782>
- McKeown, R. (2006) Education for Sustainable Development Toolkit. Online at <http://unesdoc.unesco.org/images/0015/001524/152453eo.pdf> (accessed 5/3/19).
- Mockler, N. & Groundwater-Smith, S. (2018) *Reclaiming Meaning: Questioning the Language of Reform and Improvement in Education*, Abingdon: Routledge.
- Moran, J. (2010) *Interdisciplinarity: the new Critical Idiom* - 2<sup>nd</sup> edition, Uondon: Routledge.
- Newby, P. (2010) *Research Methods for Education*, Essex: Pearson Education Limited.
- Nicol, R. (2014a) Fostering Environmental Action Through Outdoor Education, *Educational Action Research* 22(1), 39-56.
- Nicol, R. (2014b) Entering the Fray: The Role of Outdoor Education in Providing Nature-based Experiences that Matter, *Educational Philosophy and Theory* 46(5), 449-461.
- Noddings, N. (2005) *The Challenge to Care in Schools: an Alternative Approach to Education* - 2<sup>nd</sup> edition, New York: Teachers College Press.
- Norum, K. (2008) Appreciative Inquiry. In: U. Given (ed.) *The SAGE Encyclopedia of Qualitative Research Methods*, Thousand Oaks: SAGE. DOI: <http://dx.doi.org.ezproxy.is.ed.ac.uk/10.4135/9781412963909>
- One Planet Schools Report (2012) *Learning for Sustainability*, Online at: [http://assets.wwf.org.uk/downloads/1planetschools\\_web2.pdf](http://assets.wwf.org.uk/downloads/1planetschools_web2.pdf) (accessed 5/3/19).
- Priestley, M. & Minty, S. (2013) Curriculum for Excellence: A Brilliant Idea, **but.**, *Scottish Educational Review*, 45(1), 39-52.
- Reason, P. & Bradbury, H. (2006) *The Handbook of Action Research*, Uondon: SAGE.
- Rittel, H. & Webber, M. (1973) Dilemmas in a General Theory of Planning, *Policy Sciences* 4, 155-169.
- Sachs, J. (2003) *The Activist Teaching Profession*. Maidenhead: Open University Press.
- Scottish Government (2017) 2018 *National Improvement Framework and Improvement Plan for Scottish Education*, Edinburgh: The Scottish Government.
- Sustainable Development Goals (SDGs) (2015) Online at: <http://www.un.org/sustainabledevelopment/sustainable-development-goals/> (accessed 5/3/19).
- Thomas, G. & Myers, K. (2015) *The Anatomy of the Case Study*, Uondon: SAGE.
- Tomas, U., Girgenti, S. & Jackson, C. (2017) Pre-service Teachers' Attitudes Toward Education for Sustainability and its Relevance to their Uearning: Implications for Pedagogical Practice, *Environmental Education Research*, 23(3), 324-347. <https://doi-org.ezproxy.is.ed.ac.uk/10.1080/13504622.2015.1109065>
- Transforming our World: the 2030 Agenda for Sustainable Development* (2015) Online at <https://sustainabledevelopment.un.org/post2015/transformingourworld> (accessed 5/3/19).
- UNESCO (2005) *Guidelines and Recommendations for Reorienting Teacher Education to Address Sustainability*, Online at <http://unesdoc.unesco.org/images/0014/001433/143370e.pdf> (accessed 5/3/19).
- UNESCO. 2019. What is Education for Sustainable Development? [ONUINE] Available at: <https://en.unesco.org/themes/education-sustainable-development/what-is-esd>. [Accessed 27 May 2019].
- University of Edinburgh (2018) *Transformative Learning and Teaching: programme Aims*, Online at <https://www.ed.ac.uk/education/graduate-school/taught-degrees/transformative-learning/aims> (accessed: 5/3/19).
- Vision 2030+ (2016) *Concluding Report of the Learning for Sustainability National Implementation Group*, Online at: <https://education.gov.scot/improvement/documents/res1-vision-2030.pdf> (accessed: 5/3/19).
- Wrigley, T., Uingard, B. & Thomson, P. (2012) Pedagogies of Transformation: Keeping Hope Alive in Troubled Times, *Critical Studies in Education*, 53(1), 95-108.