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New Eden: Mediating Pre-service Teachers' Conceptions of Education for Sustainable Development

Debbie Myers

Abstract

In this chapter the author examines the use of Mantle of the Expert (Heathcote & Bolton, 1995) as a model of integrated curriculum design for pre-service teachers (PSTs), so they can deliver pedagogical approaches enabling their pupils to think critically about the impact of their lifestyles on the environment. Drawing on the pedagogy of dramatic inquiry (Heathcote & Bolton, 1995), primary teacher educators positioned PST's as a range of experts, working for the fictitious "Waste Not Want Not Company". In these roles, PSTs gained insights concerning the interplay between environmental, economic and social aspects of sustainable development (Colucci-Gray, Camino, Barbiero & Gray, 2006). As naturalists they mapped habitats within a forest setting; as recreations officers they identified possible social and educational uses of the forest; as scientists they analysed water quality; as planners they considered the development of a settlement New Eden, and as agentic environmental advocates they prepared delegate materials for a World Conference on Education for Sustainable Development. Using these approaches, teacher educators simultaneously provided PST's with a model of integrated curriculum design for subsequent emulation on their school-based placements.

Key Words

Dramatic inquiry, Education for sustainable development, Mantle of the Expert

Introduction

It is thirty years since a definition of sustainable development was agreed by the United Nations member states:

Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs. (Brundtland, 1987)

In 2015 UN member states adopted the 2030 Agenda for Sustainable Development consisting of 17 Sustainable Development Goals (SDGs) (DESA, 2020). The new framework, Education for Sustainable Development (ESD) for 2030 will focus on ESD as a key instrument for the delivery of the SDGs through a Global Action Plan (GAP) for ESD (UNESCO, 2014b) However, Qablan (2018, p.130) observes:

...some educators attribute current unsustainable practices and lifestyles to a specific deficiency in education systems worldwide-a lack of focus on helping learners to think critically about their own lifestyles.

Teacher educators have a key role to play in developing and modelling to pre-service teachers (PSTs) examples of curriculum-making that will enable their future pupils to think critically about their life-style choices (Mulà et al., 2017). In this chapter the author explains how teacher educators integrated dramatic inquiry, expeditionary fieldwork, story-telling and scientific enquiries to mediate PSTs conceptualisations of sustainable development. This example of practice illustrates participatory teaching and learning methods that support collective decision-making in accordance with the GAP (UNESCO, 2014a, 2014b).

Dramatic Inquiry

The use of drama as a pedagogical strategy facilitates "pedagogical border crossings", enabling teacher educators to model to PSTs how to connect subject material drawn from different disciplines (Fels & Meyer, 1997, cited in Braund, 2015, p. 112). Combining drama and science can support the examination of socio-scientific issues with PSTs including ESD (Braund, 2015; McNaughton, 2006) "by creating a learning situation that is significant in the lives of students"

(Ødegaard, 2003, p.76). Drawing upon Sjoberg's (1998) delineation of three dimensions of science as a product, process and as a social institution in society Ødegaard (2003, p.77). She observes:

Drama can successfully be used for making simulations of the real everyday world, especially in learning about science in the context of society, or where science is recontextualised for specific societal purposes. (Ødegaard, 2003, p.97)

Dorion (2009) defines drama in science education to be a form of "role-play within an imagined situation and enacted within the human dimension" (p. 2249). Mantle of the Expert (MoE) (Heathcote & Bolton, 1995) is a form of dramatic inquiry that integrates drama for learning, inquiry-based learning and expert framing. When using MoE as a pedagogical strategy, educators position groups of learners in-role as members of a fictional company or team, who collectively undertake a range of tasks to gain deeper insights. Educators position themselves as co-investigators, non-expert agents, who act in-role on the instructions of a fictitious client who has issued the team/company with a special commission. Expert framing and fictional positioning support improvisational role-play by providing learners with a structural scaffold to simultaneously maintain these dialogues (Ødegaard, 2003; Dorion, 2009).

Using Dramatic Inquiry to Teach about Sustainability

During the development of an undergraduate module of primary teacher education, tutors specialising in English, mathematics, science and ICT identified an opportunity to use drama to provide a model of integrated curriculum-making. Science tutors positioned PSTs in-role as experts working for the fictional company "The Waste Not Want Not Company Ltd" to mediate their conceptualisations of sustainability. They presented this company with a plausible commission on behalf of a client, the organising committee of the United Nations Educational and Scientific Organisation (UNESCO) World Conference on Sustainable Development (UNESCO). This commission would require experts from "The Waste Not Want Not Company Ltd" to consider different options for re-development of a forest setting and to represent these views at the World Conference. Situating this dramatic inquiry in the natural setting of a forest and then in the science teaching rooms would enable the creation of a real-world scenario providing a degree of authenticity to the activities (Budzinsky, 1995),

Who and What	Comments
Expert Team	The Waste Not Want Not Company Ltd
Client	The United Nations Education and Scientific Organisation (UNESCO) World Conference on Sustainable Development
Commission	To investigate the current management of a forest setting with respect to environmental protection and future economic growth through the creation of a new town with homes, schools, supermarkets creating employment, recreation and leisure facilities. To prepare delegates' presentations for delivery at the conference to represent different perspectives including those of the diversity of plants and animals of the forest who have no voice.
Theme	To understand that sustainable development requires a balance between the interplay of three competing pillars: environmental, economic and socio-cultural development.

Table 1: The Waste Not Want Not Company Ltd Commission

This example of MoE is an adaptation of its usual format because tutors positioned PSTs in multiple rather than one, fixed expert role. Each PST therefore had an opportunity to act in-role as a naturalist. Environmental scientist, developer/protester and recreation officer. The purpose of multiple framing was to give PSTs opportunities to develop insights into the different and competing motivations of environmental, economic and social interest groups, and therefore be better informed to advocate for a particular position.

Table 2: Dramatic roles, fictional identities and positionality

Fictional Identities	Positionality	Curricular Inquiries	Location
Naturalist	Expert	Science: Exploration, habitat mapping, identifying, classifying species of plants and animals.	Forest Setting
Environmental Scientist	Expert	Science Investigation: Measuring water quality and pH, separating plastics, analysing leaf litter	On campus science room
Developer/Protester	Expert	English: Debating the tensions between environmental, economic and socio-cultural developments	Forest then on-campus
Documentary Maker	Expert	Computing/ICT: Building a persuasive case to support an argument for or against the development of the forest setting	Forest setting
Recreation Officer	Expert	Mathematics/Exploration: Identifying the potential of the forest setting to support educational, recreational and leisure trails and activities	
Agentic Advocate	Expert	Arguing a position for sustainable development that balances competing demands: environmental, economic and socio-cultural	On- campus

Teaching Program

The module was delivered via the following teaching sequence

 Table 3: The teaching and learning sequence

PART 1: Creativity Conference	PART 2: Fieldwork in a forest setting: Expert framing	PART 3: On-campus workshops: Expert framing	PART 4	PART 5: Assessments
	English,	English, Mathematics, Science, ICT		Group Presentations
Keynote Lectures and Workshops	Economic development, Mathematics, Social Development	Science 1: Investigations Science 2:	Teaching Placements	Essay
	Science, ICT, Environmental	Developing a setting with respect to three pillars of sustainable development		Module Evaluations
PART 1: Creativity Conference	PART 2:	PART 3:	PART 4	PART 5: Assessments

Fieldwork in a forest setting: Expert framing	On-campus workshops: Expert framing	
Development, defending a position on sustainable development.	Science 3: Planning teaching, learning and assessments for placement.	

Introductory Conference

All PST's and tutors attended a whole day conference entitled: "Student Enquiry: Creativity and the Core Curriculum". The conference comprised of keynote lectures, practical workshops on English, mathematics, science and ICT, and practitioner-led workshops outlining creative approaches to teaching and learning including the use of drama. At this conference, the module aims, expected learning outcomes, timetable and assessments were shared with PSTs. The keynote lectures focused on creativity, its importance to future economic development in the United Kingdom, and on the implications of neuroscience for the development of teaching and learning. The pedagogical strategy MoE was introduced and PSTs attended a briefing about the visit to the forest setting. By the end of the conference day PSTs understood the purpose of the module was to model creative pedagogical design and curriculum-making for emulation by PSTs on placements and in employment.

PSTs were invited to take part in a research study to evaluate the effectiveness of these approaches in supporting PSTs development of creative and integrated pedagogical design in readiness for placement and future employment (Myers, 2019). Underpinned by an interpretivist paradigm a case-study was developed using mixed methods of data collection to elicit personal and contextual foci for analysis. Data was collected in the form of pre- and post-teaching questionnaires and focus group discussions. In accordance with British Educational Research Association (BERA) guidelines an ethics checklist was prepared and ethical approval was sought from the employing university to carry out the study to inform a Masters dissertation research study. The purpose of research was shared with those students who expressed interest in participating. Information and consent forms were provided together with explanations of how data would be collected, stored and used. Assurances were given that anonymity and confidentiality of participants would be maintained throughout the study. An extract of a focus group discussion relevant to the use of dramatic inquiry is shared in this chapter.

Fulfilling the Commission

Expeditionary Fieldwork in a Forest Setting

The forest is a remnant of a medieval hunting forest now covering 2,400 acres. Little of the ancient woodland now remains due to developments over many centuries and it now contains a mixture of deciduous and evergreen trees. The forest is located over one hour from the campus so PSTs travelled there by car, coach and rail for a day of workshops. All PSTs participated in-role in four workshops in English, mathematics, science and ICT during the day.

Science Expeditionary Workshop: Mapping Habitats

Science tutors positioned PSTs in the expert role as naturalists in the forest. Following in the footsteps of Charles Darwin, Joseph Banks and Mary Anning, PSTs undertook an expeditionary "journey in pursuit of knowledge" (Hodacs, 2011, p. 187) in the forest setting to replicate the habitat mapping expeditions of these early naturalists. PSTs sketched the natural features of the setting and documented evidence of human activities (eg litter, signage, roads, fencing, lighting, first aid boxes). Working in small groups, PSTs carried out habitat mapping activities in areas of the forest. These included exploring and documenting the occurrence and diversity of plants and animals at one metre transects through the forest, using quadrats and identification charts of British flora and fauna (<u>http://www.naturedetectives.org</u>). While mapping transects from sunlit to shady areas PST's discovered newts-a protected species-and were overheard role-playing this

discovery in the voice of naturalist David Attenborough "and so we find...hiding amongst the damp undergrowth ... a rare species, a protected species- the increasingly rare, smooth newt".



Figure 7.1: In role as naturalists, PSTs discover a smooth newt during habitat mapping activities

PSTs were transfixed and impressed to observe how camouflage had effectively concealed the presence of the newt. A search for newts was carefully undertaken, resulting in squeals of delight at each new find.

English Workshop: Adopting a Position

Tutors-in-role presented PSTs with a proposal to develop a substantial part of the forest setting including the area of special scientific interest that provided habitat for a protected species (the newts). This development would create a new eco-housing estate, two primary schools, a secondary school, science business park, shopping centre and recreation sites to create employment and investment opportunities. PSTs were placed at random in two equal groups with the purpose of adopting and defending a position on the issue. Sustainable Development Goal 15 requires member states to:

Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss. SDG 15 (UNESCO, 2014 b).

Mathematics Workshop: Identifying Recreation and Learning Opportunities

A mathematics tutor positioned PSTs as recreation officers to consider the development of the setting for families and a variety of user groups, for example, cubs, scouts, Brownies, girl guides, forest school, walkers, nature lovers. PSTs mapped a potential range of trails to support learning, including treasure hunts, trails to look for shapes, patterns, counting, measuring, to collect natural objects and Green Man investigations using a range of trees.

ICT Workshop: Documentary-makers Defending a Position

An ICT tutor positioned PSTs as documentary makers defending the position they adopted in the English workshop so that they developed sympathy towards one pillar of sustainability and were prepared to advocate on behalf of particular interests: environmental (protester), economic (developer), social (mediation between environmental and economic needs). PSTs created short documentaries to support arguments for or against the development of the setting. These documentaries would be edited and shared during ICT sessions on-campus.

Fulfilling the Commission: On-Campus Inquiries

Story-telling and Science Investigations

Chapter 7

PSTs were positioned as scientists to resolve damage resulting from human consumption and productivity in the woodland setting. Tutors shared the allegorical picture-book "The Tin Forest" (Ward & Anderson, 2001) with PSTs to contextualise their scientific inquiries. Rich in symbolism, "The Tin Forest" is an allegorical tale in which the deployment of visual metaphors allows readers to observe the damaging effects of unsustainable consumption and production on the environment due to their disconnection from nature (Louv, 2005). The main character however, personifies environmental agency and the potential for change. As he takes responsibility for initiating the positive changes he wishes to see in the environment and restores a living ecosystem in a scrap metal tin forest, he enables the nourishment of his psyche and reconnection with the dynamic and healing energies of nature. PSTs discussed the themes of the story, and then worked in groups to complete a carousel of science tasks.

Enquiry 1: Water Quality Analysis

PSTs analysed the quality of water samples collected from streams in the forest and on-campus, using the OPAL Citizen Science Survey resources (Imperial College London, n.d.).



Figure 7.2: In-role as scientists PST's analyse the quality of water samples from the forest and on-campus

PSTs measured the turbidity and pH of the samples: water from the stream in the forest was found to be pH7, as expected to support healthy plant and animal life. The OPAL survey (Imperial College London, n.d) showed the forest water to be of high quality because it was found to contain macro-invertebrates and therefore to support life. However, the sample from campus was of poor quality and contained no visible organisms or plants. The difference in the quality of water samples created opportunities for discussion on the possible negative impacts of human activities on environmental resources eg water, land and the presence of life forms. One student had noticed empty beer cans in this stream, which ran parallel to new student accommodation, and raised the issue of possible pollutants in the river eg alcohol. Another queried the possible leakage of building materials from the site when the accommodation was under construction.

Enquiry 2: Nature's Recycling Mechanisms

PSTs examined three samples of leaf litter for evidence of decomposition and then investigated the drainage of the samples. This activity provided an example of how nature recycles materials through processes of decomposition that contribute nutrients to the soil to support the life-cycles of plants and sustain eco-systems.

Enquiry 3: Sorting Materials

New Eden: Mediating Pre-service Teachers' Conceptions of Education for Sustainable Development

A selection of litter generated from packaging was collected from campus. It was sorted into paper/card, plastics and metals, and examined to see how they could be recycled, up-cycled or re-used.

Enquiry 4: Recycling paper

Pre-shredded wastepaper was soaked in water to create a pulp. Food colouring, leaves, petals and seeds were added and the pulp was poured onto a mould screen (a frame with a fine mesh). A deckle (resembles a picture frame) was placed on top to hold the pulp in place and create the edges of the paper. Recycled paper was produced for future use as wrapping paper, textured writing paper, carrier bags, papier-mâché containers and concertina folders.

In-role as Developers

Drawing on the collective learning generated during the range of workshops in the forest, PSTs were tasked to discuss how they could develop a substantial part of the forest setting including the area of special scientific interest (newt habitat). This re-development would create a new housing estate, two primary schools, a secondary school, science business park, shopping centre and recreation sites to create employment and investment opportunities and to provide low-cost eco-housing. PSTs were tasked to be mindful of the following inquiry questions to guide these discussions:

- 1. What is more important: continual economic growth, providing homes and jobs for people, or protecting the environment and its ecosystems?
- 2. How do we ensure sustainable development and achieve balance between competing environmental, socio-cultural or economic needs?

PSTs agreed the need to provide secure housing for people was a priority and that the development of the forest setting was an opportunity to create a model of good practice to ensure protection of the environment through responsible stewardship:

- Student 1: If you look at the letters in Need and you re-arrange them, they spell out Eden-as in Garden of Eden. It's a bit like what happened in The Tin forest-the old man created a whole eco-system from junk and it became a real eco-system. Well couldn't we, as the developers, couldn't we do the same. Couldn't we link the storylink the idea of the eco-system to the development of a garden of Eden eco-system city?
- Student 2: A new Eden!
- Student 3: A smart city but built on the principles of an eco-system?
- Student 4: That's a good idea. Nature takes care of all its rubbish better than we do.
- Student 3: Yes, nature really has found ways to decompose and recycle everything.
- Student 2: Developers should be able to design some better ways of recycling everything we use; we could compost food waste. We could use bacteria on sludge.

Group 2's suggestions for the creation of an eco-city New Eden, based on the principles of an eco-system, provided a timely teaching opportunity-to engage the whole group's attention in identifying the developmental benefits of a development of the forest as a New Eden smart settlement to fulfil local environmental, economic and socio-cultural concerns.

Pillar of Development	Concerns	Mitigations
Environmental	Loss of habitats: trees, land, water sources	Identification and classification of plants, animals and fungi by resident botanist and
	Loss of bio-diversity and ecosystems, e.g.	zoologist
	destruction of newts colony in an area of special scientific interest, loss of nesting area	Maintenance of exo- systems by forest rangers

Table 4: Sustainable development of a smart settlement: New Eden

		Management of
	Disruption of animal	woodland connicing
	brooding evolution	tree felling and planting
	breeding cycles	tree tening and planting.
		Monitoring of trees
	Litter and waste	
	management-additional	Protecting the area of
	landfill sites	scientific special interest:
		amphibians, newts
	Increasing urbanisation	
	_	Creation of educational
	Increased traffic and	trails
	deteriorating air quality	
		Maintenance of
		pathways cycle tracks
		seating
Socio cultural	Employment	Recreation leisure and
Socio-cultural		
	opportunities	education
	Afferdable and barress	
	Affordable eco-nomes	Families and group
		activities
	Schools	
		Promoting outdoor health
	Outdoor learning	activities, exercise and
	opportunities	education
	Outdoor recreation and	Forest School outdoor
	leisure, sports and	learning for school visits,
	exercise	pupil referral units. Cubs.
		Scouts Brownies
		Guides
		Culdes
		Provision of sustainable
		of materials and sources
		of energy
· · · · · · · · · · · · · · · · · · ·		
Economic	Job creation	Employment: forest
		rangers, botanist,
	Business investment	zoologist, education staff,
		hospitality staff
	Infrastructure	
		Provision of educational
	Opportunities to lead	courses
	green technologies	
	developments and	Hospitality: cafes
	renewable energy	······································
	provision	Construction of New
		Eden: generating a
		model of sustainable
		proctice for others to
		IOIIOW, WORKING IN
		partnership with
		universities and
		businesses

Environmental Advocacy: Habitats-in-Boxes

PSTs were tasked to transform their habitat mapping data into 3D habitats in boxes (eco-boxes), to create fictional eco-systems with predator-prey characters representing producers and consumers. In preparation for future teaching placements, they then identified opportunities to teach a range of environmental issues, including the impact of thoughtless consumption,

unsustainable development and its contribution to climate change through the creation of playscripts, newspaper reports and posters.

Representing those Without a Voice: Predator-prey Puppets

Using the predator-prey puppets they had created, PST's were positioned as special environmental advocates: preparing to attend the conference in-role as animal and plant delegates. They created conference presentation cards adopting the perspectives of animals and plants at risk because these members of eco-systems are vulnerable to the threats posed by global temperature rises and have no other voice or representation.

Constructing a Board Game as a Teaching Tool

PSTs were commissioned to produce a board game to raise children's awareness of the impact of climate change and the steps that might be taken to reduce or mitigate damage. The game would be presented to delegates at the World Conference and sales of the game would be used to support environmental charities. Working in groups they designed some board games based on a number track, with 3 types of collectable cards corresponding to environmental, economic or social behaviours while identifying damaging or pro-environmental behaviours. Resulting games included: Rainforest Rescue, International Rescue, Earth Watch and Endangered World. PSTs were enthusiastic about creating and using games with primary pupils to consolidate their understanding of sustainable development.

Planning for Placement

The conference, lectures and workshops provided PSTs with an example of holistic and integrated curriculum design (Alexander, 2010) to support their planning for a six-week placement to build their confidence in curriculum-making. Placement expectations were communicated to schools via a placement handbook and a well-attended placement briefing for school-based mentors and host class teachers.

Module Assessments

Post-placement Group Presentations

In groups of four, each PST presented an evaluation of their resulting planning and schemes of work developed for delivery on placements. PSTs reported that during the module they found the prospect of designing a six-week curriculum quite overwhelming, however once underway and with the support of their school-based mentors, it was an exciting, exhilarating and rewarding way to teach.

Written Assignment

Each PST completed a reflective assignment critically appraising the planning and design of their curriculum-making experiences. Taking responsibility for decision-making and for building curriculum content around the children and PST's interests, was identified as a strength of this approach.

Module Feedback

End of module evaluations were very positive and demonstrated PSTs valued opportunities to make decisions and exercise their judgement about pedagogical choices.

Analysis

How did the Use of Dramatic Inquiry Raise PSTs Awareness of Environmental Issues?

The contextualisation of science inquiries within dramatic contexts encouraged discussions about pro-environmental behaviours and is an area in which PSTs expressed great interest and would

fulfil the GAP for ESD. The discovery of a timid, protected species of newt was unexpected but provided a critical learning opportunity:

Finding real living newts that only live in this special place was amazing. It did make me think if developers really did decide to bulldoze that part to build houses it might be difficult to re-locate these creatures. Where would you find a similar place locally every space is already developed.

This discovery demonstrated to PSTs that this area was a habitat to a range of creatures-some familiar, some a surprise-and, as a habitat the forest provides for the needs of bio-diverse species who are part of a harmonious system.

Coming across the newts suddenly, just going about their lives, made me realise how vulnerable these creatures are. They've got no ideas how we can take everything away from them.

This reflection raises an issue about human predation of natural habitats as a source of resources for human consumption or use, prompting them to question what right humans have to threaten and destroy? Crist (2014, p. 143, cited in Kopnina, 2014, p. 126) observes:

Human supremacy fuels the top-down conceptualisation of Nature as a resource base, a domain to be used for our ends [...] The toxic import of the very idea of resources is unmasked by its normality – a normality instilled by the mode of existence humanity has constructed in accordance with the shared belief in our superiority.

PSTs realised this was an important aspect of sustainable development they could address with children in their future work in schools.

To what Extent did Participation in Dramatic Inquiry Inform PSTs Understanding of the Three Competing Pillars of Sustainable Development: Environmental, Economic and Social?

Positioning PSTs in expert roles, within a fictitious company, an outdoor setting, and in science workshops provided them with access to more authentic learning contexts. In these contexts, PSTs could, through dialogue, begin to experience and examine the complex nature of sustainable development due to the competing motivations of environmental, economic and social interest groups. Extracts of their discussions indicate their awareness of these competing tensions and the importance of teaching about pro-environmental behaviours:

- Student A: I thought businesses would have to anticipate problems in manufacturing and disposal of their products. I'd have thought they'd have to take actions or be fined.
- Student B: I think they know where the problems are in production and now they are fined if they breach things like emission quotas or pollute rivers or land. But it's sales that drive companies-once they've sold their products can businesses really be responsible and blamed for people's misuse of them? Look at shopping trolleysour town used to be full of them until the supermarkets were fined and they chained them all up and made everyone pay to use one. That's not the company's fault, it's people's behaviour.

To what Extent were PSTs able to Develop Dramatic Pedagogies of MoE in their own Teaching Contexts on School based Placements?

During the group presentations that followed student teaching placements, PSTs outline how they had integrated drama or role-play into their curriculum designs. Examples in Key Stage 2 (7 to 11-year-olds) included the use of role-play to teach the topic of space exploration. One student set up a NASA Mission Control in class in which children took on the role of crew of members of mission control. These roles were conducive to expert framing with everyone working together to prepare for a mission to Mars. Another PST set up a role-play about Jenner's development of vaccination to explore the ethics of carrying out an experiment on a human child to save lives. Groups of children in-role initially re-enacted a

scripted version of the historical events but then stepped out of role and adopted positions as scientists, journalists and parents to discuss what should happen if Jenner took the same course of action today.

In Early Years and Key Stage 1 PSTs used traditional tales and fairytales to provide the contexts in which to situate scientific inquiries using role-plays. For example, the story of "The Enormous Turnip" enabled one student to explore forces as pushes and pulls, and "The Big Friendly Giant" (Dahl, 1985) was used to situate a class production line of "Dream Bottles" to support inquiries about materials and their properties.

PSTs felt being able to link role-play with a story and a subject helped them to integrate different curricular subjects. Those who were willing to immerse themselves in the drama with the children felt more comfortable in attempting to develop this type of approach.

PSTs agreed the use of role-play was an excellent medium through which to explore differing points of view about serious scientific issues with children. However, some students felt constrained by the circumstances they experienced in their placement schools, for example, if there was less freedom to make choices about the design of the curriculum. On a positive note, these PSTs thought that once they gained greater experience in schools, during employment, they would like to try to incorporate drama into their lessons to help children to access and explore difficult concepts in engaging ways.

To what Extent were PSTs able to Transfer the Model of Integrated Curriculum Design to their own Teaching Contexts on School-based Placements?

PSTs group presentations, reflective assignments, and module evaluations confirmed that the module had provided valuable professional development to PSTs and they did all attempt to engage in curriculum-making during placement. Within each group presentation, individual PSTs outlined their school contexts, they shared their plans, outcomes and evaluations. A recurring view was their recognition of the value of having a degree of autonomy in decision-making about what and how they chose to teach a topic on placement. In their evaluations, PSTs acknowledged the importance of ensuring the statutory learning objectives and outcomes for each subject were taught effectively through careful monitoring. In science it was felt the use of drama actually enhances the purpose and application of skills, for example, as PSTs worked scientifically to test the quality of water samples in the campus science workshops.

The aim of the module was to provide a model of integrated curriculum design to PSTs for emulation in employment. The module was successful in doing this, however, teacher educators acknowledged the increasing demands placed on class teachers to deliver a crammed primary timetable and how little control PSTs would be granted in taking responsibility for curriculum design whilst on placement.

Conclusion

This chapter has examined how teacher educators deployed the pedagogy of dramatic inquiry to mediate PSTs conceptualisations of sustainable development. Positioning PSTs in fictitious roles as experts facilitated their collaborative knowledge creation through interplay of their fictional identities and positionalities. In these expert positions PSTs were able to identify, problematise and consider how to mitigate potential damage to the environment. This example of practice accords with the GAP for ESD (UNESCO, 2014b, p.12), as teacher-educators included the key sustainable development issues of bio-diversity and sustainable consumption into their teaching and highlighted the facilitation of collective decision-making to identify future actions.

The use of dramatic inquiry provided a fictitious context in which they could examine real world problems using dialogue and collective decision-making to reach consensus regarding the development of a forest setting. Connecting dramatic inquiry, story-telling, visits and taught subjects enables tutors to address socio-scientific issues (Ødegaard, 2003; Braund,

2015), while providing a model of integrated curricular design (Alexander 2010). PSTs were supported to recognise their roles as potential agents of change (Ødegaard) responsible for educating the next generation to encourage environmental advocacy and stewardship. In turn, by emulating these approaches, PSTs can now support future pupils to reflect upon the ways they live and the impacts of their choices on the Earth and its diminishing resources (Brundtland, 1987).

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