It’s like a fruit on a tree

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It's like a fruit on a tree: Young Maltese children's understanding of the environment

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Abstract
With increasing evidence and concern over human impacts on planetary systems, young children are more likely to be exposed to such changes and be affected by them over their life time. This qualitative multiple case study explores the ways in which young children (aged 3 – 7 years) in Malta perceive the environment. Preliminary data were collected via observations in two state schools and one family household. Document analysis and semi-structured conversational interviews with 9 children, including children's drawings and their interpretations of them provided breadth and depth to the data collection process. Findings indicate that children perceived the environment as nature consisting of different elements of flora and faun found in the Maltese Islands; in terms of a human-environment relationship; as an asset to humanity; and, as a sense of place and identity. While they held some misconceptions around issues of air pollution, they also exhibited protective dispositions. The implications of these findings for the policy and practice of early childhood education for sustainability (ECEfS), and some of the directions for future research that stem from this study, are discussed.

Keywords: early childhood education for sustainability; young children; nature; environment; case study

Introduction

Good quality early childhood education (ECEC), the education of young children between birth and eight years of age (European Commission Directorate-General for Education and Culture [EURYDICE], 2019), has been recognised for its potential to empower young children "to take informed decisions and responsible actions for environmental integrity, economic viability and a just society for present and future generations" (UNESCO 2017, p. 7). Young children playing and learning in nature has been a characteristic of ECEC pedagogies since the time of Froebel and his idea of kindergarten (Elliott, 2018; Wilson, 2019). Evidence suggests that learning opportunities *in*, *with*, *about* and *for* nature in ECEC can instill a sense of appreciation and responsibility towards the environment in young children, making the early years an idea starting point for learning about the environment and for early childhood education for sustainability [ECEfS] (Pramling Samuelsson & Kaga, 2008; Spiteri, 2016, 2020).

Nature and the environment

Notions of "nature" and the "environment" are problematic. Part of the problem lies in definitions and in the variety of ways these terms are operationalised and measured, making them both contested terms (Elliott, 2018; Payne, 2014). Nature has been defined as the great

outdoors (Louv, 2005), an entity dominated by humans for the advancement of humanity (Wilson, 2019), and as separate from humans or something which is experienced differently by different people (Payne, 2014). The environment has been referred to as sense of place (Loughland, Reid, & Petocz, 2002; Payne, 2014), which refers to people's connection to a place in the physical sense. It also constitutes any cognition, affection, meanings and values people attribute to places in which they interact and grow, thus implying a moral significance of the meaning humans attribute to nature (James, 2009).

Anthropocentric conceptualisations of nature and the environment reinforce discourse around the Cartesian dualism of a human-nature dichotomy, where nature is considered as a system of living and non-living elements, separate from, and possibly excludes, humans, resulting in dominance over nature by humans, an idea reinforced by Western curricula (Elliott & Young, 2016; Wilson, 2019). Indeed, the idea that nature is something to be used and manipulated is reinforced in ECEC curricula via the romanticised images of children and nature common to ECEC practice (Elliott & Young, 2016), keeping humanity repeating the same distructive patterns over and over again (Malone, 2016). This calls for a reconsideration of an image of young children in partnership with nature (Elliott, 2018; Elliott & Young, 2016). Thus, pointing to a shift from anthropocentrism towards ecocentrism, that highlights a reciprocal relationship between the biophysical environment and the role and effects of human impact, where humans are part of nature, but not superior to it (Christie & Higgins, 2020; Nicol, 2012), even in ECEC. For the purpose of this paper, "nature" and "environment" are used as synonmymous terms, while working towards Smyth's (1998, p. 1) definintion of the environment as something "physical and biological, human and non-human, natural, cultivated and constructed, social and political, cultural and aesthetic, and temporal with a past and future."

Early childhood education for sustainability

The United Nations' sustainable development goals (SDGs) recognise the importance of ECEC in achieving a sustainable future in SDG 4 (Target 4.7) (United Nations, 2015; UNESCO, 2019). The terms "sustainability" and "sustainable development" are often used interchangeably and in reference to EE and education for sustainability (ESD) in the literature (Sterling, 2010). For the purpose of this paper, we refer to EE, ESD and ECEfS as related concepts that refer to "the process by which one learns how to act in a sustainable way and therefore to 'sustainable development'" (Christie & Higgins, 2020, p. 2).

The move from EE to ECEfS is important in that it signals a significant shift in thinking from adults acting as role models and facilitators of children's environmental learning towards children acting as agents of change in protecting the environment (Davis, 2009) by helping them become active and critical learners (Pramling Samuelsson & Kaga, 2008; Spiteri, 2020). ECEfS aims to achieve environmental improvement via education progammes which address environmental and sustainability issues with young children based on their everyday experiences (Arlemalm-Hagser & Elliott, 2020; Davis & Elliott, 2014; Pramling Samuelsson & Kaga, 2008; Spiteri, 2016, 2020). Towards this end, ECEfS programmes are often built around a child-centred pedagogy that adapts to the children's world and listens to them (Pramling Samuelsson, 2015). Via rich learning experiences in nature, children build their knowledge, skills and dispositions to achieve sustainability now and in the future (Davis, 2018; Pramling Samuelsson & Kaga, 2008; Spiteri, 2020, UNESCO, 2017). In doing so, ECEfS empowers children to act as future decision-makers and guardians of the environment (Davis, 2009; Davis & Elliott, 2014; Engdahl, 2015; Pramling Samuelsson, 2015; Spiteri, 2020;

UNESCO, 2017). Such competences are necessary to allow children to apprehend and to play a key role in addressing sustainability issues, even in the early years (Spiteri, 2020).

ECEfS also deals with relationships and values, including the relationship between human beings and nature, and relationships between the economy and living conditions (Arlemalm-Hagser & Elliott, 2020). With the help of caring adults and peers, young children can build meaningful relationships with the environment, even though such practices vary across cultures (Pramling Samuelsson, 2015). Such relationships are precursors to future sustainable behaviours, especially by preserving and caring for nature in a sustainable way (Elliott, 2018). This means that young children are required to consider complex interdisciplinary issues related to science and the environment. Yet, the question as to what constitutes a universally-accepted vision of ECEfS programmes still remains (Pramling Samuelsson, 2015).

Environmental research with young children

Evidence suggests that young children possess environmental knowledge (Barraza & Robottom, 2008; Engdahl & Rabušicová, 2011; Madden & Liang, 2017; Palmer et al., 1999; Palmer & Suggate, 2004; Rios & Menenez, 2017; Spiteri, 2016). However, inconsitencies in research have also been reported in terms of how young children sometimes understand the environment as equivalent to nature, which also includes humans (Bonnett & Williams, 1998; Keliher, 1997; Madden & Liang, 2017) and sometimes they understand the environment as nature, which does not include humans (Payne, 2014; Rejeski, 1982). Such inconcistencies may result from difficulties in using terminology of environmental issues (Loughland et al., 2002; Madden & Liang, 2017). In this regard, Palmer et al. (2003) suggest that the availability of teaching resources and teacher training could play a critical role in ensuring the acquisition of appropriate environmental knowledge by young children. However, empirical findings in this regard are inconsistent too. For example, Owens (2004) and Musser and Diamond (2008) show that children who participated in pro-environmental activities expressed more positive attitudes towards the environment (Owens, 2004; Musser & Diamond, 1999), while Barraza (1999) and Barraza and Robottom (2008) report that this is not always the case. Together these studies indicate that context plays a role in determining children's perceptions of the environment and their pro-environmental behaviour in different cultures worldwide (Barraza & Robottom, 2008; Bronfenbrenner & Morris, 2006).

Children who lack experiences in nature from an early age, tend to regard the environment as a threatening place in later life (Elliott, 2018; Louv, 2005; Rios & Menezes, 2017). Consequently, they express a sense of fear of nature (Keliher, 1997; Rickinson, 2001). Louv (2005, p. 34) is very explicit on the negative consequences of children being denied opportunities to play, learn, wonder and experience the joy of being in nature, suggesting this leads to a "nature-deficit disorder." There is evidence to suggest (Grodzieska-Jurczak et al., 2006) that young children living in rural environments report a stronger and more frequent environmental stance than those from urban areas, indicating that when studying environmental issues and concepts among preschool children, location variations need to be factored for. Perhaps such fear could be reduced by exposing children to experiences in nature, to help them connect with nature (Elliott, 2018; Madden & Liang, 2017; Phenice & Griffore, 2003; Wilson, 2019). In this paper, connectedness to nature is defined as the appreciation and understanding of the interconnection between different life systems on earth, including human and non-human, which moves beyond love for, and enjoyment of, nature, towards an understanding of the importance of all of nature's aspects, including those which are not aesthetically attractive (Barrera-Hernández et al., 2020).

Within the ECEfS field there is ongoing debate about whether young children should be exposed to environmental problems, and the grief and the ethical dilemmas that may come with that (Pramling Samuelsson, 2011). However, recent research shows that adults often underestimate the abilities of young children to talk about the environment, sustainability and issues related to these (Engdahl, 2015; Spiteri, 2016). So, if adults have been underestimating children's abilities, now is an important time to rethink and accelerate the role of ECEfS as a driver for sustainability. This means that educators need to reassess their teaching and learning delivery in relation to what counts as suitable content, methods and assessment practices relating to sustainability.

If ECEfS is to be effectively and successfully implemented, appropriately designed programmes need to offer meaningful learning linked to children's prior knowledge of emerging issues and understandings of the environment, rather than on *assumptions* of what they know and believe (Keliher, 1997; Loughland et al., 2002; Payne, 2014; Wals, 1994). This can play an important role in determining what is taught in school (Colliver & Fleer, 2016) and ensures children's active participation in environmental initiatives now and in the future. This clearly shows that the need for further research exploring the knowledge-practice and rhetoric-reality gaps previously signalled by Davis (2009), still remains (Arlemalm-Hagser & Elliott, 2020). Specifically, research needs to shed more light on young childern's understanding of the environment (Madden & Liang, 2017), especially those living on small islands like Malta.

This paper aims to fill this gap by in ECEfS research by providing a Maltese multiple case study on young children's (aged 3–7 years) understanding of the environment and what motivates and influences them to protect it. The research aims to generate evidence rooted in young children's understanding of the concept with the aim of imporving how programmes related to the environment are designed in ECEC, based on children's understandings. Additionally, it looks at how new spaces might encourage more in-depth discussions for children's voices to be heard and valued in meaningful ways.

Theoretical framework

This study is informed by various theories of child development because no theory fully explains all salient aspects of child development. Therefore, it draws on a range of theories to help create a foundation on which to build an ECEfS research approach to enable us to answer the research questions. The recognition of children as social agents of change has increased the recognition of the importance of children's views in research. Listening to, and acknowledging, children's voices (Christensen & Prout, 2005) is necessary to ensure children's agency and active participation in decision-making and sustainability-related actions (Engdahl, 2015; Spiteri, 2016). Drawing on these philosophical perspectives of constructivism (Piaget, 1952), socio-cultural theory (Vygotsky, 1978), the bioecological model of human development (Bronfenbrenner & Morris, 2006) and theories of intergenerational influences (Istead & Shapiro, 2014), and influenced by Article 12 of the United Nations Convention for the Rights of the Child [UNCRC] (UN, 1989) and the new understandigs of the child and children as proposed by the new sociology of childhood (Tisdall & Punch, 2012), this study adopted a listening to children approach (Clark & Moss, 2011).

Together, these theoretical assumptions acknowledge the holistic affective and cognitive nature of child development and early childhood construction of knowledge as a process defined by social and cultural beliefs, practices and experiences. Additionally, they represent

the appropriate lenses which helped us to understand how children develop their perceptions of the environment.

Research design

The larger study from which the findings presented in this paper are drawn was conducted as a doctoral research exploring young children's perceptions of environmental sustainability and the contextual influences upon thes in Malta (Spiteri, 2016). This paper, however, will only present findings related to the children's understanding of the environment, and what motivates and influences them to protect it. Accordingly, it asks the following research questions:

- What understandings of the environment do young Maltese children (aged 3-7 years) hold?
- What influenced their understanding?

Since environmental knowledge is socially constructed (Barraza & Robottom, 2008), understanding of how children make sense of the environment, aligns well with the interpretive paradigm and a qualitative methodology (Merriam, 1998; Miles, Huberman, & Saldana, 2020). An interpretive lens and a case study design, involving multiple cases was chosen in order to take account of, and gain insight into children's understanding of the environment. The benefit of case study for this research is that it investigates different factors influencing the phenomenon under study, and leads to its in-depth understanding and its embeddedness in a bounded social context (Stake, 2006; Miles et al., 2020).

We intentionally selected nine case studies (see Table 1) of the initial 12 case studies because these were "the most study-relevant" cases, which mostly spoke to the research questions (Miles et al., 2020, p. 30). Each individual case study is considered as a specific entity, influenced by the uniqueness of the contextual factors and the determining factors that occurred both inside (the child's understandings of the phenomenon) and outside each case (the influence of context on the child's understandings of the phenomenon) (Stake, 2006). These provide rich descriptions and in-depth constructions and understandings of children's perceptions of the environment (Merriam, 1998; Stake, 2006).

This paper seeks to provide meaningful insights into key themes arising from children's understanding of the environment rather than attempting to generalise indisputable truths (Stake, 2006). Specifically, it aims to optimise our understanding of the unique features of the cases through narrative, rather than to generalise beyond the case to other cases. The reason for this choice is that even though multiple case studies provide a comparison with other cases (Miles et al., 2020), this was secondary to an in-depth and high-quality understanding of each case in the study (Stake, 2006).

Context

We conducted this study in Malta, which is an archipelago of three islands (Malta, Gozo and Comino), situated in the heart of the Mediterranean Sea. With an area of approximately 316 km^2 (National Statistics Office [NSO], 2014), and a population of about 475,701 residents (NSO, 2019), Malta is densely populated. Coupled with Malta's long history of colonialism, Roman Catholic religion, tight-knit community (Sultana & Baldacchino, 1994), the education

system and the impact of these on the environment, make Malta an interesting context to study.

Education in Malta is split between compulsory education, for children between ages five and 16, and non-compulsory education, for children between three months and four years and 11 months. Education is provided by the State, Church and independent institutions, and the Ministry of Education and Employment (MEDE) is the Government agency responsible for formal education in Malta (EURYDICE, 2019). The ECEC sector is split in three setors: the pre-school childcare centres for children aged 3 months up to 2 years 9 months; kindergartens for children aged 2 years 9 months and five years; and the first two years of primary school. Attendance in pre-school childcare centres and in kindergarten is non-compulsory until age five.

Within the largely centralised education system (EURYDICE, 2019), all schools in Malta follow the same curriculum and abide by all the regulations as listed in the Education Act (EURYDICE, 2019; MEDE, 2012, 2013). The Eco-Schools programme was introduced in Malta in 2002 to introduce ESD in schools (Sharma, Andreou, & Daa Funder, 2019). Previous intensive efforts to impliment ESD in Malta have not always been successful (Spiteri, 2016). To date, even though ESD is a component of compulsory education and is integerated in various subjects, the majority of school-based ESD-related initiatives are extra-curricular (Sharma et al., 2019).

Participants

Data for this study was collected in two primary State schools and one household, located in the southern part of Malta. Both schools were engaged in the international Eco-Schools programme and had already obtained the Green Flag award. Both were intentionally selected as being representative of pedagogical approaches regarding environmental education (EE) as a result of their participation in the Eco-Schools programme. To ensure confidentiality both schools remain unnamed. The participants were nine children, five girls and four boys (see Table 1).

Table 1. The participants.

Child	Age	Gender
Sarah	3 years 4 months	F
Jazlyn	3 years 8 months	F
Denzil	4 years 5 months	M
Amie	5 years 6 months	F
Ylenia	6 years 5 months	F
John	6 years 5 months	M
Jaylee	6 years 7 months	F

Liam	7 years 2 months	M
Francesco	7 years 6 months	M

Ethics

The University of Edinburgh ethics committee and education authorities in Malta approved the research proposal. The selection criteria for interviewees were that children should first be granted parental consent to participate in this study and be from different grade levels in ECEC, irrespective of their experience and personal backgrounds. Based on these criteria, consent was also sought from the participants as co-creators of data collection. Participant consent included publishing rights.

To safeguard anonymity, pseudonyms were used for the participants. Before conducting the observations and interviews, children were given a brief explanation about the role of the research, were asked (verbally and in writing) if they wanted to voluntarily participate in this study and whether they were happy for their responses to be audio recorded. All participants were told that they could withdraw at any time. All agreed to participate. To ensure voluntary consent from children, they were asked whether they wanted to participate in this research and prior to the interview the corresponding author reminded them that they could quit the research whenever they wanted. All interviews were conducted in Maltese (the children's first language), then audio-recorded, transcribed and translated into English by the corresponding author. All interviews were conducted in schools, except for one, which was conducted in the family home. Participants received a copy of their transcripts and none of them made any change. All participants returned the copy of their transcripts.

Data collection

This study employed research methods commonly used in qualitative case study research (Merriam, 1998; Miles et al., 2020; Stake, 2006), which included document analysis of the National Minimum Curriculum [NMC] (Ministry of Education, 1999) and semi-structured with children, children's drawings and their interpretations of them to triangulate the data.

Children's drawings in EE research have primarily focussed on gaining insight into young children's understanding of the environment (Rejeski, 1982) but often children's drawings were interpreted by adults. In this study, we adopted a listening to children approach (Clark & Moss, 2011) and asked children to interpret their own drawings to avoid imposing adult interpretations on their drawings. A puppet was used as a prop and a constructivist tool to help children discuss the issue under study (Brown, 2001), to assist children in engage with the scientific complexity involved in discussing the environment.

Data analysis

Data analysis of each case study took place at two stages – first, within the case; and second, across cases (Miles et al., 2020; Stake, 2006). Continuous and simultaneous data collection and analysis took place iteratively throughout the study (Merriam, 1998). The corresponding author of this paper transcribed, and coded interviews and observations manually. Three

external researchers read and checked the coded interviews to minimise bias. All interviews were anonymised. We followed Marshall and Rossman's (2011, pp. 209–224) seven-step qualitative data analysis process, which included organisation of the data, immersion in the data, coding the data, writing analytic memos, generating categories/themes, offering interpretations and search for alternative findings, and writing the research.

This paper is centred on the cross-case analysis and concentrates on presenting the common themes as they emerged from the conversational interviews with children and their drawings, which mostly speak to the research questions (Miles et al., 2020).

Findings

Here, we present the data obtained via children's drawings and conversational interviews with them. Children appeared to understand the term environment in six qualitatively different ways: as nature, as a place, as an asset, as human-environment relationship, protection, and learning about it.

Environment as nature

Most children conceived of the environment as synonymous with prestine nature, made up of living components and elements of nature most commonly found in their context. While children's descriptions of nature were varied and dynamic, they included a biological dimension of nature as made up of living things, such as trees, flowers and insects.

Amie (Figure 1) discussed the environment as:

> *Flowers, trees, birds, and bees*. *This is the environment with the sun, the grass and a flower*.

Figure 1. Amie's drawing of the environment.

Francesco (Figure 2) described the environment as including as positive images of nature:

> *This is nature, with lots of trees, flowers and butterflies.*

Figure 2. Francesco's idea of the environment.

Interestingly, at the beginning of the conversational interviews, children's definitions of the environment were marked by minimal human influence and interference as primary characteristics of nature. As the conversations progressed, they expanded their definition of the environment.

Environment as a place

Some children described the environment as a sense of place in a geographical manner, and inluded both familiar and distal natural contexts.

Denzil talked about the environment as a place for sourcing food:

> *It's the place where we get food to cook in our kitchen.*

The environment as the children's neighbourhood and the local Maltese context was mentioned by Liam:

> *Malta, the most beautiful place on the face of the Earth.*

Jaylee defined the environment as nature, and as a sense of both local and distant place:

> *The environment is nature and the whole world, for example the place where you live, such as Australia or Malta. That's the environment.*

John talked about nature as place in general:

> *Nature is a very nice place to be in for me.*

Environment as an asset

The environment was considered an asset to humanity and as a life support system for the survival of humanity. This is reflected in the way some children focussed on the way the environment can support their quality of life.

Jazlyn (Figure 3) explained:

Figure 3. Jazlyn's drawing of the environment.

Puppet: *Why did you draw a tree and the sea?*
Jazlyn: *Because I have trees at home and we take care of them.*
Puppet: *Why do you take care of them?*
Jazlyn: *Because they make grapes and we take grapes in a bag and we eat them when we go to the beach.*

Similarly, Ylenia said:

The environment for me is the trees, plants, the sea, and like that and people can enjoy nature and it helps people live.

John too perceived nature as a source of wellbeing for humanity:

Nature keeps people healthy because it is a source of life for them.

Human-environment relationship

Children expanded their definition of the environment to include human-nature relationships.

Denzil (Figure 4) included himself in his description of the environment:

Figure 4. Denzil's drawing of the environment

Denzil: *That is a boy*.
Puppet: *What is he doing?*
Denzil: *That's me but I cannot move on this paper.*
Puppet: *What would you do if you could move?*
Denzil: *I would go outside and walk here and there and see the trees and the flowers and collect some fruit to take home.*

Ylenia (Figure 5) included human-made objects (a bench) in her defintion of the environment as nature. She included minimal human influence as a common characteristic of the environment.

Ylenia: *I drew an orange tree, the sun, and two butterflies. Another tree and a girl sitting on a bench and some bushes*.
Puppet: *What else can you tell me about your picture?*
Ylenia: *This is a girl and she is in the environment and she is eating an apple and here are two birds as well. Trees are part of the environment*.

Figure 5. Ylenia's drawing of the environment.

John also included his home and himself in his definition (Figure 6).

I drew nature because it is a very nice place to be in for me.

Figure 6. John's drawing of the environment.

While providing an ecological insight of nature, children acknowledged that nature was not a static entity but rather subject to change due to human intervention. They expressed a dynamic idea around human-environment interctions, using words to indicate that such relationship was still external to nature. For example, even though Sarah said that trees are good for people because they provide food, at another instance during the interview she said:

Sarah: *People can chop down trees.*
Puppet: *Why?*
Sarah: *People need to build houses.*
Puppet: *And do people need trees to build houses?*
Sarah: *Yes.*
Sarah: *Because they (trees) give us food.*
Puppet: *You mean fruits?*
Sarah: *Yes, they give us food.*

Indeed, this is an interesting finding because in Malta house are made of stone and not of wood, but such an idea merits further investigation.

It was clear that children conceptualised humans as part of nature and they were aware of the impact of human intervention in nature. Francesco's drawing (Figure 7) caputres a sense of resignation to the inevitable negative consquences of human intervention in nature, even if this warrants further investigation.

Figure 7. The current state of the environment by Francesco.

Children's observations of the human-environment realtionship included several environmental problems, such as air pollution. Denzil said:

> *The Earth is dirty. Smoke and exhaust make the place dirty. That is not good. Smoke is not good*.

Erroneously, Denzil referred to the grey or black smoke as harmful to the environment.

Francesco depicted (Figure 8) his worries about air pollution in Malta too. Francesco too referred to the black smoke coming out of the chimneys as:

> *That is pollution from the power station and it is going to kill us*.

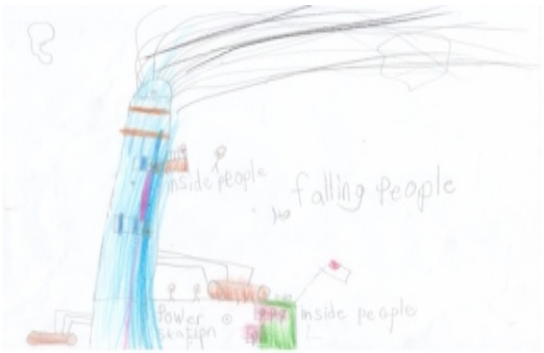

Figure 8. Francesco's drawing of air pollution caused by power stations.

Environmental protection

Children suggested that humans and the environment are in a dynamic and mutual sustaining relationship. Consequently, they provided a strong normative assetion where nature was described as something to be looked after, therefore moving away from the anthropocentric perspective towards a more ecocentric perspective. For example, Sarah believed that people were responsible to:

> *Take care of nature*.

Ylenia too said:

> *People should keep the world clean. People should only use materials as much as they need, and they do not waste them.*

Jaylee included children:

By recycling, children are leaving a better world for other people ... otherwise they, the other people, would cry because they would not have anything left.

However, later Jaylee (Figure 9) explained that adults were more responsible for protecting the environment because they had to set a good example to children.

Figure 9. Jaylee's drawing of the environment.

Likewise, Liam said:

Children and adults are responsbile for the environment.

John included himself in the protection of the environment, therefore recognising his role in either harming or helping the environment:

For me the environment is nature and I know how to take care of it. We need to take good care of it. They (people) are killing nature bit by bit because they (people) do not care.

Similarly, Francesco indicated awarness of loss of non-human species should human intervention in nature continue. He also linked the cutting down of trees to the extinction of some animal species and decreased resources for humans:

If we chop down a lot of trees, animals may die forever.

While this perspective might sound anthropocentric, it indicates an ecological dimension of nature as a precursor to the development of ecocentric thoughts from an early age.

Parents were also included in children's protective dispositions by Denzil:

Denzil: *Mums and Dads should take care of everything.*
Puppet: *Even the environment?*
Denzil: *Yes.*

Francesco mentioned the government as being responsible to care for the environment:

The Government, adults and children are responsible.

Learning about the environment

Both schools emerged as a significant contexts for learning about the environment. Here, the influence of the Eco-Schools programme emerged as a significant influence on children's learning about the environment, particularly with its emphasis on recycling. Both schools were participating in a recycling competition organised by MEDE.

John and Liam explained their dual interest in the Eco-Schools programme and in their protection of the environment. John said:

I recycle at school to care for the environment and to win the recycling competition.

Similarly, Laim explained:

> *I recycle because I want Malta to be the most beautiful place on the face of the Earth. I also want my school to win the recycling competition so I recycle at home and I collect recyclable material and bring it to school, for the competition.*

Reference to TV and family as sources of learning about the environment were mentioned very sporadically and thus did not turn out to be significant in children's learning about the environment. Nevertheless, mentions of learning about the socio-political or econcomic aspects of the environment were absent from children's data.

Discussion

While the present study was small, hence not reflective of the wider population, it does provide rich and detailed accounts of young children's understanding of the environment and some of the contextual influences upon these. This research is preliminary with findings presented here in a manner that, first, remains true to children's voices (UN, 1989), and second is speculative in its limited theorising about children's understanding of the environment. Despite the exploratory nature of this research, a number of prelimary conclusions, implications for teaching, and recommendations for further research, can be drawn.

Our data suggest that children conceptualised the environment as nature, consisting of different elements of flora and fauna found mostly within their context. Children indicated preference to pristine nature as indicated in their romantic images of nature. An idea possibly influenced by the term "environment" in the NMC (Ministry of Education, 1999), which was oriented towards an understanding of the environment as consisting of natural elements and habitats only. Our data echo existing research suggesting that children are influenced by ideas of the environment as being associated nature and biodiversity, as often found in Western curricula (Barazza & Robottom, 2008; Bonnet & Williams, 1998; Keliher, 1997; Madden & Liang, 2017; Payne, 2014; Rejeski, 1982; Rios & Menezes, 2017; Wals, 1994). What is significant in this study is that children also provided positive images of nature in ecocentric ways and their defintions of the environment as nature aligned closely with Smyth's (1998, p. 1). Specifically, they described the environment as nature and as being physical, biological, human and non-human, social, cultivated, aesthetic and temporal with a past and a future. However, the political and cultural aspects of nature as mentioned by Smyth (1998) were missing in children's discourse. If correct, these observations point to the question of how children conceive of the environment and nature as both the same and as pure, and how these are portrayed in Western ECEC curricula.

Children appeared also to relate to the environment as a sense of place in geographical manner. Indeed, connection to the land as a physical and spiritual space created a sense of belonging and identity, a popular concept in EE (Payne, 2014). This finding indicates that from the children's perspective, nature is more than just space with natural elements, such as trees and flowers; rather it comprises complex features and landscapes of local and distant places, a notion which could have helped them develop an empathy for the planet and possibly presents a potential for deepening young children's connection to nature. Some of the children's conversations also centred around enjoyment of nature, empathy for non-human species and a sense of responsibility towards nature while expressing some ecocentric approach towards nature. Consequently, they were agentic in capitalising on this knowledge

and engaged with nature in order to reap some of the benefits they identified. For example, they said that nature is necessary for the survival and wellbeing of humanity and in order to protect it they engaged with recycling activities in school and beyond. While this finding suggests that a sense of place and belonging is meaningful to young children, it merits further investigation.

Possibly, children's connection to the environment as a place increased their knowledge and awareness of local enviromental issues (air pollution) better. This is a significant finding because it indicates that at this age (3 – 7 years), children are already starting to form their own understanding about the environment, based on their lived experiences within a socio-cultural context (Keliher, 1997; Vygotsky, 1978). Furthermore, children focused on environmental issues which concerned them the most, suggesting that their perceptions of environmental issues might be related to what was important to them and how they felt about it (Barraza, 2001). As a result, they expressed a sense of temporality of nature as something which is subject to change, thus indicating that they were aware of the impact of human intervention in nature. Consequently, they exhibited protective dispositions towards the environment. This was reflected in the way they viewed the environment in terms of a reciprocal human-nature relationship, where nature was considered as critical to the survival of humanity, for example by providing food, and as a source wellbeing for humanity, but also in need of protection. While this finding suggests an anthropocentric worldview, and possibly a limited understanding of the complex relationships inherent in the human-nature relationship, it indicates that young children's understanding of the environment as a place for the wellbeing for humanity was influenced by their affection and feelings towards nature. Indeed, there is some evidence in the literature to suggest that young children have some understanding of the human-nature relationship, in that they tend to compare the environment in terms of its suitability for entertainment and they demonstrate an appreciation of nature as a source of food and survival (Bonnett & Williams, 1998; Keliher, 1997; Loughland et al., 2002; Madden & Liang, 2017; Payne, 2014; Rios & Menezes, 2017). Additionally, suggestions of different generations, including children and adults, working together to protect the environment were frequently mentioned by various children. These ideas are important in that they indicate that at such a young age, children already have formed perceptions around different generations of people working together for the benefit of the environment, which is a precursor to the achievement of a sustainable future. Most importantly, these findings extend the ECEfS literature by foregrounding children's agency in the reasoning behind why they see nature as beneficial to human and non-human species. Therefore, these findings suggest there is need for a reconsideration of an alternative curriculum framework, which offers broader and more inclusive worldviews about the environment and which includes the relationship between human, non-human and other species together, even in ECEC.

Even if our data comes from a multiple-case study with a limited number of participants it is nevertheless interesting to note that the schools' major contribution appears to be in fostering knowledge and practice of environmental activities via the Eco-Schools programme. In line with prior research (Musser & Diamond, 2008; Owens, 2004), children generally recognised learning about the environment in the school context, with education *about* the environmental clearly prevailing over education *in* the environment.

Our data aling closely with prior research (Bonnett & Williams, 1998; Palmer, 1995; Palmer & Suggate, 2004) in that children also held misconceptions. With respect to children's understanding of environmental issues resulting from human intervention in nature, a majoy

inconsistent, if not contradictory, finding can be pointed out – the idea that black smoke is harmful for the environment. Denzil and Francesco associated black smoke rather than the burning of fossil fuels with environmental damage. However, such misconceptions may be determined by what they were able to perceive through their senses, i.e. they referred to pollution as "dirt", as something visible and with a horrible smell instead of referring to CO_2 which is invisible. Such misconceptions could be influenced by external influences, such as textbooks and the media (Rickinson, 2001), which depict smoke as harmful due to its dark colour rather than due to its scientific implications. Alternatively, this may not be a misconception at all but rather a linguistic problem, where young children have not yet developed the appropriate vocabulary to express their ideas in scientific terms. Similar findings were reported by Madden and Liang (2017). Resesarch by Loughland et al. (2002) provides support here by pointing out that children in secondary school were better at using more sophisticated language to describe the environment than primary children. Indeed, this inconcistancy points to the need for further inquiry into how young children conceptually uderstand environmental issues. A related question could possibly ask how young children reconcile this apparent contradiction.

Conclusion

While our findings cannot be generalised to different contexts, they highlight the fact that young children possess knowledge and awareness of the environment and certain environmental issues, and can participate in discussions with adults about them. Consequently, we suggest a rethink of the assumed competence levels of young children in talking about the environment and environmental issues.

Our results provide support for the idea that place-responsive educational approaches in ECEfS are key to educate young children in becoming active and informed participants, who can contribute to managing and solving environmental issues within their local contexts. This calls on practitioners and policymakers to take advantage of the children's conceptualisations of, and positive emotions towards, the environment as a point of departure for the development of ECEfS programmes based on children's understandings. While this strategy is not a guarantee of children acting sustainability now, and in the future, the fact that they have been exposed to such experiences may help them to at least try in some ways to act sustainability.

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